



Search Notes

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(FILE 'HOME' ENTERED AT 10:20:16 ON 29 JUN 2004)

L1 FILE 'HCAPLUS' ENTERED AT 10:20:35 ON 29 JUN 2004
1 S US20020108147/PN

FILE 'REGISTRY' ENTERED AT 10:21:04 ON 29 JUN 2004

L2 FILE 'HCAPLUS' ENTERED AT 10:21:07 ON 29 JUN 2004
TRA L1 1- RN : 43 TERMS

L3 FILE 'REGISTRY' ENTERED AT 10:21:07 ON 29 JUN 2004
43 SEA L2

L4 FILE 'USPATFULL, USPAT2' ENTERED AT 10:21:14 ON 29 JUN 2004
1 S US20020108147/PN

L5 FILE 'WPIX' ENTERED AT 10:21:20 ON 29 JUN 2004
1 S US20020108147/PN

L6 FILE 'REGISTRY' ENTERED AT 10:24:31 ON 29 JUN 2004
3 L3 AND DESATURASE

=> b hcap

FILE 'HCAPLUS' ENTERED AT 10:25:48 ON 29 JUN 2004
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FILE COVERS 1907 - 29 Jun 2004 VOL 141 ISS 1
FILE LAST UPDATED: 28 Jun 2004 (20040628/ED)

This file contains CAS Registry Numbers for easy and accurate substance identification.

'OBI' IS DEFAULT SEARCH FIELD FOR 'HCAPLUS' FILE

=> d all l1

L1 ANSWER 1 OF 1 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2002:182219 HCAPLUS
DN 136:242927
ED Entered STN: 14 Mar 2002
TI Cloning of $\Delta 6$ -desaturase gene from evening primrose and its use in γ linolenic acid (GLA) production in transgenic plants
IN Thomas, Terry L.
PA Rhone-Poulenc Agrochimie, Fr.
SO U.S., 53 pp., Cont.-in-part of U.S. 5,789,220.

CODEN: USXXAM
 DT Patent
 LA English
 IC ICM A01H005-00
 ICS C12N015-82; C12N005-04; C12N015-09
 NCL 800281000
 CC 3-2 (Biochemical Genetics)
 Section cross-reference(s): 7, 10, 11, 17
 FAN.CNT 4

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|---|------|----------|-----------------|--------------|
| PI | US 6355861 | B1 | 20020312 | US 1997-934254 | 19970919 |
| | ZA 9207777 | A | 19930421 | ZA 1992-7777 | 19921009 |
| | US 5552306 | A | 19960903 | US 1994-307382 | 19940914 |
| | US 5789220 | A | 19980804 | US 1997-789936 | 19970128 |
| | US 6683232 | B1 | 20040127 | US 2000-685775 | 20001010 |
| | US 2002108147 | A1 | 20020808 | US 2001-29756 | 20011221 <-- |
| | US 2004078845 | A1 | 20040422 | US 2003-702777 | 20031106 |
| PRAI | US 1991-774475 | B2 | 19911010 | | |
| | US 1992-817919 | B2 | 19920108 | | |
| | US 1992-959952 | B1 | 19921013 | | |
| | US 1994-307382 | A2 | 19940914 | | |
| | US 1997-789936 | A2 | 19970128 | | |
| | US 1994-366779 | A1 | 19941230 | | |
| | US 1997-934254 | A3 | 19970919 | | |
| | US 2000-685775 | A3 | 20001010 | | |
| AB | Linoleic acid is converted into γ -linolenic acid by the enzyme $\Delta 6$ -desaturase. The present invention is directed to isolated nucleic acids comprising the $\Delta 6$ -desaturase gene from evening primrose. More particularly, the isolated nucleic acid comprises the promoter, coding region and termination regions of the $\Delta 6$ -desaturase gene. The present invention provides recombinant vectors expressing $\Delta 6$ -desaturase gene controlled by heterologous regulatory promoter and terminator elements. The nucleic acids and recombinant constructions of the instant invention are useful in the production of GLA in transgenic organisms. | | | | |
| ST | linoleate desaturase cDNA sequence evening primrose; linolenate gamma prodn Oenothera linolenate desaturase gene transgenic plant | | | | |
| IT | Cauliflower mosaic virus (35 S promoter of; cloning of $\Delta 6$ -desaturase gene from evening primrose and use in γ linolenic acid (GLA) production in transgenic plants) | | | | |
| IT | Promoter (genetic element) RL: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses) (35S, of CaMV; cloning of $\Delta 6$ -desaturase gene from evening primrose and use in γ linolenic acid (GLA) production in transgenic plants) | | | | |
| IT | Anabaena (carboxylase gene of; cloning of $\Delta 6$ -desaturase gene from evening primrose and use in γ linolenic acid (GLA) production in transgenic plants) | | | | |
| IT | Genetic engineering Genetic vectors Oenothera Protein sequences Transformation, genetic cDNA sequences (cloning of $\Delta 6$ -desaturase gene from evening primrose and use in γ linolenic acid (GLA) production in transgenic plants) | | | | |

- IT Animal cell
Embryophyta
Eubacteria
Fungi
Plant cell
(expression host; cloning of $\Delta 6$ -desaturase gene from evening primrose and use in γ linolenic acid (GLA) production in transgenic plants)
- IT Gene, plant
RL: AGR (Agricultural use); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
(for $\Delta 6$ -desaturase; cloning of $\Delta 6$ -desaturase gene from evening primrose and use in γ linolenic acid (GLA) production in transgenic plants)
- IT Globulins, biological studies
RL: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses)
(helianthinin, promoter from the gene for; cloning of $\Delta 6$ -desaturase gene from evening primrose and use in γ linolenic acid (GLA) production in transgenic plants)
- IT Albumins, biological studies
RL: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses)
(napins, promoter from the gene for; cloning of $\Delta 6$ -desaturase gene from evening primrose and use in γ linolenic acid (GLA) production in transgenic plants)
- IT Seed
(oilseed, transgenic expression host; cloning of $\Delta 6$ -desaturase gene from evening primrose and use in γ linolenic acid (GLA) production in transgenic plants)
- IT Proteins
RL: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses)
(oleosins, promoter from the gene for; cloning of $\Delta 6$ -desaturase gene from evening primrose and use in γ linolenic acid (GLA) production in transgenic plants)
- IT Glycinins
RL: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses)
(promoter from the gene for; cloning of $\Delta 6$ -desaturase gene from evening primrose and use in γ linolenic acid (GLA) production in transgenic plants)
- IT Promoter (genetic element)
RL: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses)
(seed or tissue-specific, in regulation of $\Delta 6$ -desaturase gene expression; cloning of $\Delta 6$ -desaturase gene from evening primrose and use in γ linolenic acid (GLA) production in transgenic plants)
- IT Seed
Synechocystis
(termination signal specific to; cloning of $\Delta 6$ -desaturase gene from evening primrose and use in γ linolenic acid (GLA) production in transgenic plants)
- IT Genetic element
RL: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses)
(terminator, seed or tissue-specific, in regulation of $\Delta 6$ -desaturase gene expression; cloning of $\Delta 6$ -desaturase gene from evening primrose and use in γ linolenic acid (GLA) production in transgenic plants)

- IT Daucus carota
Nicotiana tabacum
Peanut (Arachis hypogaea)
Rape (plant)
Soybean (Glycine max)
Sunflower
Zea mays
(transgenic expression host; cloning of $\Delta 6$ -desaturase gene from evening primrose and use in γ linolenic acid (GLA) production in transgenic plants)
- IT 403776-61-4, Desaturase, linoleate (Oenothera)
RL: AGR (Agricultural use); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
(amino acid sequence; cloning of $\Delta 6$ -desaturase gene from evening primrose and use in γ linolenic acid (GLA) production in transgenic plants)
- IT 506-26-3P, γ -Linolenic acid
RL: AGR (Agricultural use); BPN (Biosynthetic preparation); BIOL (Biological study); PREP (Preparation); USES (Uses)
(cloning of $\Delta 6$ -desaturase gene from evening primrose and use in γ linolenic acid (GLA) production in transgenic plants)
- IT 25448-06-0P, Octadecatetraenoic acid
RL: AGR (Agricultural use); BPN (Biosynthetic preparation); BYP (Byproduct); BIOL (Biological study); PREP (Preparation); USES (Uses)
(cloning of $\Delta 6$ -desaturase gene from evening primrose and use in γ linolenic acid (GLA) production in transgenic plants)
- IT 9082-66-0P, Linoleate desaturase
RL: AGR (Agricultural use); BPN (Biosynthetic preparation); PRP (Properties); BIOL (Biological study); PREP (Preparation); USES (Uses)
(cloning of $\Delta 6$ -desaturase gene from evening primrose and use in γ linolenic acid (GLA) production in transgenic plants)
- IT 403776-60-3
RL: AGR (Agricultural use); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
(nucleotide sequence; cloning of $\Delta 6$ -desaturase gene from evening primrose and use in γ linolenic acid (GLA) production in transgenic plants)
- IT 9031-55-4, Carboxylase
RL: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses)
(of Anabaena, promoter from the gene for; cloning of $\Delta 6$ -desaturase gene from evening primrose and use in γ linolenic acid (GLA) production in transgenic plants)
- IT 71245-09-5, Nopaline synthase
RL: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses)
(terminator of the gene for; cloning of $\Delta 6$ -desaturase gene from evening primrose and use in γ linolenic acid (GLA) production in transgenic plants)
- IT 403777-67-3, 1: PN: US6355861 SEQID: 1 unclaimed DNA 403777-69-5, 3: PN: US6355861 SEQID: 3 unclaimed DNA 403777-70-8, 4: PN: US6355861 SEQID: 4 unclaimed DNA
RL: PRP (Properties)
(unclaimed nucleotide sequence; cloning of $\Delta 6$ -desaturase gene from evening primrose and its use in γ linolenic acid (GLA) production in transgenic plants)
- IT 403777-68-4 403777-71-9
RL: PRP (Properties)
(unclaimed protein sequence; cloning of $\Delta 6$ -desaturase gene from evening primrose and its use in γ linolenic acid (GLA) production in

transgenic plants)
IT 253426-99-2 369366-28-9 369366-29-0 403619-87-4 403619-88-5
403619-89-6 403619-90-9 403619-91-0 403619-92-1 403619-93-2
403619-94-3 403619-95-4 403619-96-5 403619-97-6 403619-98-7
403619-99-8 403620-00-8 403620-01-9 403620-02-0 403620-03-1
403777-72-0 403777-73-1 403777-74-2 403777-75-3 403777-76-4
403777-77-5 403777-78-6 403777-79-7 403777-80-0 403777-81-1
403777-82-2

RL: PRP (Properties)

(unclaimed sequence; cloning of $\Delta 6$ -desaturase gene from evening
primrose and its use in γ linolenic acid (GLA) production in
transgenic plants)

RE.CNT 1 THERE ARE 1 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

(1) Deluca, V; AgBiotech News and Information 1993, V5(6), P225N

=> b reg

FILE 'REGISTRY' ENTERED AT 10:27:05 ON 29 JUN 2004

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STRUCTURE FILE UPDATES: 28 JUN 2004 HIGHEST RN 700803-86-7

DICTIONARY FILE UPDATES: 28 JUN 2004 HIGHEST RN 700803-86-7

TSCA INFORMATION NOW CURRENT THROUGH JANUARY 6, 2004

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Experimental and calculated property data are now available. For more
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<http://www.cas.org/ONLINE/DBSS/registryss.html>

=> d ide tot 16

L6 ANSWER 1 OF 3 REGISTRY COPYRIGHT 2004 ACS on STN

RN 403776-61-4 REGISTRY

CN Desaturase, linoleate (Oenothera) (9CI) (CA INDEX NAME)

OTHER NAMES:

CN 7: PN: US6355861 SEQID: 27 claimed protein

FS PROTEIN SEQUENCE

MF Unspecified

CI MAN

SR CA

LC STN Files: CA, CAPLUS, USPATFULL

DT.CA Caplus document type: Patent

RL.P Roles from patents: BIOL (Biological study); PRP (Properties); USES
(Uses)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

*** USE 'SQD' OR 'SQIDE' FORMATS TO DISPLAY SEQUENCE ***

1 REFERENCES IN FILE CA (1907 TO DATE)

1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L6 ANSWER 2 OF 3 REGISTRY COPYRIGHT 2004 ACS on STN
RN 403776-60-3 REGISTRY
CN DNA (Oenothera linoleate desaturase cDNA plus flanks) (9CI) (CA
INDEX NAME)
OTHER NAMES:
CN 6: PN: US6355861 SEQID: 26 claimed DNA
FS NUCLEIC ACID SEQUENCE
MF Unspecified
CI MAN
SR CA
LC STN Files: CA, CAPLUS, USPATFULL
DT.CA Caplus document type: Patent
RL.P Roles from patents: BIOL (Biological study); PRP (Properties); USES
(Uses)

RELATED SEQUENCES AVAILABLE WITH SEQLINK

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

*** USE 'SQD' OR 'SQIDE' FORMATS TO DISPLAY SEQUENCE ***
1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L6 ANSWER 3 OF 3 REGISTRY COPYRIGHT 2004 ACS on STN
RN 9082-66-0 REGISTRY
CN Desaturase, linoleate (9CI) ✓ (CA INDEX NAME)
OTHER NAMES:
CN Δ-6-Desaturase ✓
CN Δ6 Acyl lipid desaturase
CN Δ6-Acyl CoA desaturase
CN Δ6-Desaturase ✓
CN Acyl-CoA 6-desaturase ✓
CN Desaturase, fatty acid Δ6, ✓
CN Fatty acid Δ6-desaturase
CN Fatty acid 6-desaturase ✓
CN Fatty acyl Δ6-desaturase
CN Linoleate desaturase ✓
CN Linoleic acid desaturase ✓
CN Linoleic desaturase ✓
CN Linoleoyl CoA desaturase ✓
CN Linoleoyl-coenzyme A desaturase ✓
CN Long-chain fatty acid Δ6-desaturase ✓
MF Unspecified
CI MAN
LC STN Files: AGRICOLA, BIOBUSINESS, BIOSIS, BIOTECHNO, CA, CAPLUS, EMBASE,
TOXCENTER, USPAT2, USPATFULL
DT.CA Caplus document type: Conference; Dissertation; Journal; Patent
RL.P Roles from patents: ANST (Analytical study); BIOL (Biological study);
FORM (Formation, nonpreparative); OCCU (Occurrence); PREP (Preparation);
PROC (Process); PRP (Properties); USES (Uses)
RL.NP Roles from non-patents: ANST (Analytical study); BIOL (Biological
study); FORM (Formation, nonpreparative); OCCU (Occurrence); PREP
(Preparation); PROC (Process); PRP (Properties); RACT (Reactant or
reagent); USES (Uses); NORL (No role in record)
RLD.NP Roles for non-specific derivatives from non-patents: BIOL (Biological
study); PREP (Preparation); PRP (Properties)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

625 REFERENCES IN FILE CA (1907 TO DATE)
2 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA

625 REFERENCES IN FILE CAPLUS (1907 TO DATE)

=> b uspatall

FILE 'USPATFULL' ENTERED AT 10:26:05 ON 29 JUN 2004

CA INDEXING COPYRIGHT (C) 2004 AMERICAN CHEMICAL SOCIETY (ACS)

FILE 'USPAT2' ENTERED AT 10:26:05 ON 29 JUN 2004

CA INDEXING COPYRIGHT (C) 2004 AMERICAN CHEMICAL SOCIETY (ACS)

=> d bib abs ind 14

L4 ANSWER 1 OF 1 USPATFULL on STN
 AN 2002:200033 USPATFULL
 TI Production of gamma linolenic acid by a delta6-desaturase
 IN Thomas, Terry L., College Station, TX, UNITED STATES
 PI US 2002108147 A1 20020808 <--
 AI US 2001-29756 A1 20011221 (10)
 RLI Continuation of Ser. No. US 1997-934254, filed on 19 Sep 1997, PATENTED
 Continuation-in-part of Ser. No. US 1997-789936, filed on 28 Jan 1997,
 PATENTED Continuation-in-part of Ser. No. US 1994-307382, filed on 14
 Sep 1994, PATENTED Continuation of Ser. No. US 1992-959952, filed on 13
 Oct 1992, ABANDONED Continuation-in-part of Ser. No. US 1992-817919,
 filed on 8 Jan 1992, ABANDONED Continuation-in-part of Ser. No. US
 1991-774475, filed on 10 Oct 1991, ABANDONED
 DT Utility
 FS APPLICATION
 LREP Scully, Scott, Murphy & Presser, 400 Garden City Plaza, Garden City, NY,
 11530
 CLMN Number of Claims: 46
 ECL Exemplary Claim: 1
 DRWN 27 Drawing Page(s)
 LN.CNT 1796
 CAS INDEXING IS AVAILABLE FOR THIS PATENT.
 AB Linoleic acid is converted into γ -linolenic acid by the enzyme
 Δ 6-desaturase. The present invention is directed to isolated
 nucleic acids comprising the Δ 6-desaturase gene. More
 particularly, the isolated nucleic acid comprises the promoter, coding
 region and termination regions of the Δ 6-desaturase gene. The
 present invention provides recombinant constructions comprising the
 Δ 6-desaturase coding region in functional combination with
 heterologous regulatory sequences. The nucleic acids and recombinant
 constructions of the instant invention are useful in the production of
 GLA in transgenic organisms.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

INCL INCLM: 800/281.000
 INCLS: 800/278.000; 800/287.000; 536/023.600
 NCL NCLM: 800/281.000
 NCLS: 800/278.000; 800/287.000; 536/023.600
 IC [7]
 ICM: C12N015-82
 ICS: A01H005-00; C12N015-29; C12P007-64

CHEMICAL ABSTRACTS INDEXING COPYRIGHT 2004 ACS on STN

| | | | PATENT | KIND | DATE |
|----|---------------|------|---------|------|----------|
| OS | CA 119:64918 | * WO | 9306712 | A1 | 19930415 |
| | CA 126:289996 | US | 5614393 | A | 19970325 |
| | CA 136:242927 | US | 6355861 | B1 | 20020312 |

CA 125:160370 WO 9621022 A2 19960711
 * CA Indexing for this record included
 CC 3-2 (Biochemical Genetics)
 Section cross-reference(s): 16
 ST desaturase gene Synechocystis cloning linolenate manuf
 IT Plant
 (chill-resistant, cloning of Δ -6-desaturase gene of Synechocystis
 in relation to preparation of)
 IT Gene, microbial
 (for Δ -6-desaturase of Synechocystis, cloning and expression of,
 γ -linolenic acid manufacture in relation to)
 IT Deoxyribonucleic acid sequences
 (of Δ -6-desaturase and Δ -12-desaturase of Synechocystis)
 IT Protein sequences
 (of Δ -6-desaturase of Synechocystis)
 IT Plasmid and Episome
 (pAM854- Δ -12 and pAM854- Δ -6 and - Δ -12,
 Δ -12-desaturase and Δ -6-desaturase genes on, expression in
 Synechococcus of)
 IT Corn
 Peanut
 Rape (plant)
 Soybean
 Sunflower
 Tobacco
 (transgenic, γ -linolenic acid-producing, cloning of
 Δ -6-desaturase gene of Synechocystis in preparation of)
 IT Fermentation
 (γ -linolenic acid, with recombinant microbes,
 Δ -6-desaturase gene of Synechocystis cloning and expression in
 relation to)
 IT 148734-39-8, Δ -6-Desaturase (Synechocystis clone csy75-3.5)
 (amino acid sequence of and cloning in Anabaena of gene for)
 IT 9082-66-0, Δ -6-Desaturase 72536-70-0, Δ -12-Desaturase
 (gene for, of Synechocystis, cloning and expression of,
 γ -linolenic acid manufacture in relation to)
 IT 506-26-3P, γ -Linolenic acid
 (manufacture of, cloning and expression of Δ -6-desaturase gene of
 Synechocystis in relation to)
 IT 25448-06-0P, Octadecatetraenoic acid
 (manufacture of, with organism deficient in γ -linolenic acid, cloning
 of Δ -6-desaturase gene of bacterial Synechocystis in relation to)
 IT 148734-40-1 148734-41-2 148734-42-3
 (nucleotide sequence and cloning in Anabaena of)

=> b wpix

FILE 'WPIX' ENTERED AT 10:26:13 ON 29 JUN 2004
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FILE LAST UPDATED: 24 JUN 2004 <20040624/UP>
 MOST RECENT DERWENT UPDATE: 200440 <200440/DW>
 DERWENT WORLD PATENTS INDEX SUBSCRIBER FILE, COVERS 1963 TO DATE

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>>> THE DISPLAY LAYOUT HAS BEEN CHANGED TO ACCOMODATE THE NEW FORMAT GERMAN PATENT APPLICATION AND PUBLICATION NUMBERS. SEE ALSO:
<http://www.stn-international.de/archive/stnews/news0104.pdf> <<<

=> d all 15

L5 ANSWER 1 OF 1 WPIX COPYRIGHT 2004 THOMSON DERWENT on STN
 AN 2003-066659 [06] WPIX
 CR 1993-134023 [16]; 1996-333997 [33]; 2002-380944 [41]; 2004-118584 [12];
 2004-340086 [31]
 DNN N2003-051714 DNC C2003-017232
 TI Novel nucleic acid encoding evening primrose delta-6-desaturase, useful for producing plant with increased gamma linolenic acid content, and for inducing octadecatetraeonic acid production in plant.
 DC C06 D16 P13
 IN THOMAS, T L
 PA (THOM-I) THOMAS T L
 CYC 1
 PI US 2002108147 A1 20020808 (200306)* 55 C12N015-82 <--
 ADT US 2002108147 A1 CIP of US 1991-774475 19911010, CIP of US 1992-817919 19920108, Cont of US 1992-959952 19921013, CIP of US 1994-307382 19940914, CIP of US 1997-789936 19970128, Cont of US 1997-934254 19970919, US 2001-29756 20011221
 PRAI US 1997-934254 19970919; US 1991-774475 19911010;
 US 1992-817919 19920108; US 1992-959952 19921013;
 US 1994-307382 19940914; US 1997-789936 19970128;
 US 2001-29756 20011221
 IC ICM C12N015-82
 ICS A01H005-00; C12N015-29; C12P007-64
 AB US2002108147 A UPAB: 20040514
 NOVELTY - An isolated nucleic acid (I) encoding an evening primrose Delta 6-desaturase comprising a sequence (S1) of 452 amino acids fully defined in the specification, is new.
 DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:
 (1) a vector (II) comprising (I);
 (2) an expression vector (III) comprising (I) operably linked to a promoter (constitutive promoter or tissue-specific promoter) which effects expression of the gene product of the isolated nucleic acid, and/or termination signal capable of effecting expression of the gene product of the isolated nucleic acid;
 (3) a cell (IV) comprising (II) or (III);
 (4) a transgenic bacterium or plant (V) comprising (I), (II) or

(III);

(5) a plant or progeny of the plant (VI) regenerated from (IV); and
(6) inducing (M) production of gamma linolenic acid (GLA) in an organism deficient or lacking in or producing low levels of GLA and linoleic acid (LA), involves transforming the organism with an isolated nucleic acid encoding bacterial Delta 6-desaturase and an isolated nucleic acid encoding Delta 12-desaturase or an expression vector comprising an isolated nucleic acid encoding evening primrose Delta 6-desaturase and an isolated nucleic acid encoding Delta 12-desaturase.

USE - (I), (II) or (III) is useful for producing a plant (such as sunflower, soybean, maize, tobacco, peanut, carrot or oil seed rape plant) with increased GLA content, by transforming a plant cell with (I), (II) or (III), and regenerating a plant with increased GLA content from the plant cell, for inducing or increasing production of GLA in an organism lacking in or producing low levels of GLA, by transforming the organism with (I), (II) or (III), and for inducing production of octadecatetraeonic acid in at least one of a plant deficient or lacking in or producing low levels of octadecatetraeonic acid, a bacterium which produces alpha -linolenic acid, or a bacterium which exhibits a Delta 15-desaturase activity on a GLA substrate, by transforming the plant or bacterium with (I), (II) or (III) (all claimed). (I), (II) or (III) is useful in the production of GLA in transgenic organisms.

Dwg.0/14

FS CPI GMPI

FA AB; DCN

MC CPI: C04-A0800E; C04-A08C2E; C04-E02E; C04-E03E; C04-E04; C04-E08;
C04-F0100E; C04-F1000E; C10-C04E; D05-H12A; D05-H12D5; D05-H12E;
D05-H14; D05-H14A1; D05-H16B; D05-H17A3

=> b home

FILE 'HOME' ENTERED AT 10:27:15 ON 29 JUN 2004

=> d his

(FILE 'HOME' ENTERED AT 14:09:09 ON 29 JUN 2004)

FILE 'HCAPLUS' ENTERED AT 14:09:37 ON 29 JUN 2004

L1 (625)SEA FILE=HCAPLUS ABB=ON PLU=ON 9082-66-0/OBI
 L2 (547)SEA FILE=HCAPLUS ABB=ON PLU=ON DESATURASE/OBI (1A) (LINOLEATE
 L3 (154)SEA FILE=HCAPLUS ABB=ON PLU=ON DESATURASE/OBI (3A) (LINOLEOYL
 L4 (1)SEA FILE=HCAPLUS ABB=ON PLU=ON D6DES/OBI
 L5 693 SEA FILE=HCAPLUS ABB=ON PLU=ON (L1 OR L2 OR L3 OR L4)
 L6 134 FATTY (1A) (ACYL OR ACID) (1A) .DELTA.6 (1A) DESATURASE
 L7 693 L5-6
 L8 1 403776-61-4
 L9 1 DESATURASE (1A) LINOLEATE (1A) OENOTHERA

FILE 'REGISTRY' ENTERED AT 14:23:10 ON 29 JUN 2004

L10 1746 DESATURAS?
 L11 787 L10 AND NUCLEIC/FS

FILE 'HCAPLUS' ENTERED AT 14:27:58 ON 29 JUN 2004

L12 90577 GENETIC ENGINEERING+NT/CT
 L13 73706 GENETICS+OLD,NT/CT
 L14 62354 CDNA SEQUENCES/CT
 E NUCLEIC ACIDS/CT
 E E3+ALL
 L15 660211 NUCLEIC ACIDS+OLD,NT/CT
 E NUCLEOTIDES/CT
 E E3+ALL
 L16 289226 NUCLEOTIDES+NT/CT
 L17 421 L11
 L18 662661 GENETIC?/CC,SX
 L19 510 (L7 OR L8 OR L9 OR L17) AND (L12 OR L13 OR L14 OR L15 OR L16 O
 L20 140 L19 AND (PY<=1997 OR PRY<=1997 OR AY<=1997 OR PD<19970919 OR PR
 L21 15 L20 AND (PLANT METABOLISM OR BORAGO OFFICINALIS OR LIMNANTHES D
 E THOMAS T/AU
 L22 447 E3,E15,E18-19,E27,E31,E71-78
 E RHONE POULENC?/CS,PA
 E RHONE POULENC/CS
 L23 10215 RHONE POULENC?/CS,PA
 L24 9 L20 AND L22
 L25 6 L20 AND L23
 L26 131 L20 NOT L24
 L27 3 L21 AND L22
 L28 12 L21 NOT L27
 L29 119 L26 NOT L28
 L30 17 L29 AND (PLANT OILS OR NEMATODE OR OLEATE DESATURASE OR BORAGE
 L31 12 L29 AND (CDNA SEQUENCES OR LIPID CONTENT OR SEQUENCING OR VEGET
 L32 8 L29 AND (GENE EXPRESSION OR IMPROVED PAST RESISTANCE OR SEEDS O
 L33 35 L30-32
 SEL AN DN L28 1-5 7 9
 L34 7 E1-21 AND L28
 SEL AN L33 2-10 16-17 24 26-27 33
 L35 15 E22-51 AND L33
 L36 84 L29 NOT L33
 L37 6 L36 AND (SESAME OR IMPROVED PEST RESISTANCE OR CYANOBACTERIUM O
 L38 9 L36 AND (SESAME OR IMPROVED PEST RESISTANCE OR CYANOBACTERIUM O
 SEL AN 1-7 9
 L39 8 E52-67 AND L38
 L40 30 L34 OR L35 OR L39
 L41 9 L24 OR L25 OR L27

=> b hcap

FILE 'HCAPLUS' ENTERED AT 16:27:23 ON 29 JUN 2004
USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.
PLEASE SEE "HELP USAGETERMS" FOR DETAILS.
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FILE COVERS 1907 - 29 Jun 2004 VOL 141 ISS 1
FILE LAST UPDATED: 28 Jun 2004 (20040628/ED)

This file contains CAS Registry Numbers for easy and accurate substance identification.

'OBI' IS DEFAULT SEARCH FIELD FOR 'HCAPLUS' FILE

=> d all hitrn 140 tot

L40 ANSWER 1 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 2002:609920 HCAPLUS
DN 137:164735
ED Entered STN: 15 Aug 2002
TI **Human desaturase gene** and uses thereof
IN Mukerji, Pradip; Leonard, Amanda Eun-Yeong; Huang, Yung-Sheng; Das, Tapas
PA Abbott Laboratories, USA
SO U.S., 88 pp., Cont.-in-part of U.S. 5,972,664.
CODEN: USXXAM
DT Patent
LA English
IC ICM C12P007-40
ICS C12N009-02; C12N001-20; C12N015-00; C07H021-04
NCL 435136000
CC 3-3 (Biochemical **Genetics**)
Section cross-reference(s): 7, 13, 17, 62, 63
FAN.CNT 7

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|----|---|------|----------|-----------------|--------------|
| PI | US 6432684 | B1 | 20020813 | US 1999-227613 | 19990108 <-- |
| | US 5972664 | A | 19991026 | US 1997-833610 | 19970411 <-- |
| | WO 9846765 | A1 | 19981022 | WO 1998-US7422 | 19980410 <-- |
| | W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM | | | | |
| | RW: GH, GM, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG | | | | |
| | US 6428990 | B1 | 20020806 | US 1999-439261 | 19991112 <-- |
| | CA 2358543 | AA | 20000713 | CA 1999-2358543 | 19991229 |

WO 2000040705 A2 20000713 WO 1999-US31163 19991229
 WO 2000040705 A3 20001109
 W: AU, BG, BR, CA, CN, CZ, HU, IL, JP, KR, MX, NO, NZ, PL, RO, SI, SK, TR
 RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE
 EP 1141252 A2 20011010 EP 1999-966710 19991229
 R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI
 US 2003104596 A1 20030605 US 2002-191513 20020709 <--
 PRAI US 1997-833610 A2 19970411 <--
 WO 1998-US7422 A2 19980410
 US 1999-227613 A2 19990108
 WO 1999-US31163 W 19991229
 AB The subject invention relates to the identification of a gene involved in the desatn. of polyunsatd. fatty acids at carbon 5 (i.e., "human .DELTA.5-desaturase") and to uses thereof. In particular, human .DELTA.5-desaturase may be utilized, for example, in the conversion of dihomogamma-linolenic acid (DGLA) to arachidonic acid (AA) and in the conversion of 20:4n-3 to eicosapentaenoic acid (EPA). AA or polyunsatd. fatty acids produced therefrom may be added to pharmaceutical compns., nutritional compns., animal feeds, as well as other products such as cosmetics. The subject invention relates to the identification of a gene involved in the desatn. of polyunsatd. fatty acids at carbon 5 (i.e., "human .DELTA.5-desaturase") and to uses thereof. The cDNA encoding human .DELTA.5-desaturase was isolated from a human monocyte cDNA library based on its homol. to desaturases from Mortierella alpina desaturase and use of the Incyte LifeSeq database of expressed sequence tags. Human .DELTA.5-desaturase may be utilized, for example, in the conversion of dihomogamma-linolenic acid (DGLA) to arachidonic acid (AA) and in the conversion of 20:4n-3 to eicosapentaenoic acid (EPA). AA or polyunsatd. fatty acids produced therefrom may be added to pharmaceutical compns., nutritional compns., animal feeds, as well as other products such as cosmetics.
 ST human desaturase cDNA sequence expression vector; nutrition compn polyunsatd fatty acid desaturase
 IT Fats and Glyceridic oils, biological studies
 RL: FFD (Food or feed use); BIOL (Biological study); USES (Uses) (borage seed; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
 IT Oat
 (bran; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
 IT Caseins, biological studies
 RL: FFD (Food or feed use); BIOL (Biological study); USES (Uses) (calcium complexes; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
 IT Bacillus subtilis
 Candida
 Cyanobacteria
 Escherichia coli
 Eukaryota
 Fungi
 Hansenula
 Insecta
 Kluyveromyces
 Lipomyces starkeyi
 Mammalia
 Pichia
 Prokaryote

Saccharomyces cerevisiae
 Saccharomyces pastorianus
 Trichoderma
 Yarrowia lipolytica
 Yeast
 (cell, .DELTA.5-desaturase can be expressed in; protein and cDNA
 sequences of human .DELTA.5-desaturase gene and uses thereof)
 IT Canola oil
 Coconut oil
 Diglycerides
 Mineral elements, biological studies
 Monoglycerides
 Protein hydrolyzates
 Soybean oil
 Vitamins
 RL: FFD (Food or feed use); BIOL (Biological study); USES (Uses)
 (composition containing polyunsatd. fatty acids and; protein and cDNA
 sequences
 of human .DELTA.5-desaturase gene and uses thereof)
 IT Genetic vectors
 (comprising .DELTA.5-desaturase; protein and cDNA sequences of human
 .DELTA.5-desaturase gene and uses thereof)
 IT Culture media
 (containing an essential fatty acids; protein and cDNA sequences of human
 .DELTA.5-desaturase gene and uses thereof)
 IT Rice (Oryza sativa)
 (crisped; protein and cDNA sequences of human .DELTA.5-desaturase gene
 and uses thereof)
 IT Food
 (dietetic; protein and cDNA sequences of human .DELTA.5-desaturase gene
 and uses thereof)
 IT Whey
 (electrodialyzed, composition containing polyunsatd. fatty acids and;
 protein
 and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
 IT Gene, animal
 RL: BSU (Biological study, unclassified); BIOL (Biological study)
 (encoding .DELTA.5-desaturase; protein and cDNA sequences of human
 .DELTA.5-desaturase gene and uses thereof)
 IT Fats and Glyceridic oils, biological studies
 RL: FFD (Food or feed use); BIOL (Biological study); USES (Uses)
 (fish; protein and cDNA sequences of human .DELTA.5-desaturase gene and
 uses thereof)
 IT Syrups (sweetening agents)
 (high-fructose hydrolyzed starch; protein and cDNA sequences of human
 .DELTA.5-desaturase gene and uses thereof)
 IT Safflower oil
 RL: FFD (Food or feed use); BIOL (Biological study); USES (Uses)
 (high-oleic; protein and cDNA sequences of human .DELTA.5-desaturase
 gene and uses thereof)
 IT Milk substitutes
 (human; protein and cDNA sequences of human .DELTA.5-desaturase gene
 and uses thereof)
 IT Syrups (sweetening agents)
 (hydrolyzed starch; protein and cDNA sequences of human
 .DELTA.5-desaturase gene and uses thereof)
 IT Animal cell
 (insect, recombinant host; protein and cDNA sequences of human
 .DELTA.5-desaturase gene and uses thereof)
 IT Animal cell

- (mammalian, recombinant host; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT Fatty acids, biological studies
 RL: BSU (Biological study, unclassified); FFD (Food or feed use); BIOL (Biological study); USES (Uses)
 (monounsaturated; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT Flavoring materials
 (natural and artificial; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT Bran
 (oat; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT Cottonseed oil
 RL: FFD (Food or feed use); BIOL (Biological study); USES (Uses)
 (partially hydrogenated; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT Fatty acids, biological studies
 RL: BSU (Biological study, unclassified); BIOL (Biological study)
 (polyunsaturated; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT Cocoa products
 (powders; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT Cosmetics
 Dietary fiber
 Drugs
 Feed additives
 Food additives
 Honey
 Human
 Malt
Molecular cloning
 Protein sequences
cDNA sequences
 (protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT Fatty acids, biological studies
 RL: BSU (Biological study, unclassified); FFD (Food or feed use); BIOL (Biological study); USES (Uses)
 (protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT Caseins, biological studies
 Corn oil
 RL: FFD (Food or feed use); BIOL (Biological study); USES (Uses)
 (protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT Plant cell
 (recombinant host; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT Milk
 (skim, electrodialyzed, composition containing polyunsaturated fatty acids and; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT Caseins, biological studies
 RL: FFD (Food or feed use); BIOL (Biological study); USES (Uses)
 (sodium complexes; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT Polysaccharides, biological studies
 RL: FFD (Food or feed use); BIOL (Biological study); USES (Uses)

- (soy; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT Lecithins
RL: FFD (Food or feed use); BIOL (Biological study); USES (Uses)
(soya; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT Proteins
RL: FFD (Food or feed use); BIOL (Biological study); USES (Uses)
(soybean, composition containing polyunsatd. fatty acids and; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT Diet
(supplements; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT 446887-57-6, Desaturase, fatty acid .DELTA.5- (human)
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(amino acid sequence; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT 1783-84-2, Dihomo-.gamma.-linolenic acid 24880-40-8
RL: BSU (Biological study, unclassified); BIOL (Biological study)
(as substrate of .DELTA.5-desaturase; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT 50-81-7, Vitamin C, biological studies 50-99-7, Glucose, biological studies 63-42-3 1406-16-2, Vitamin D 1406-18-4, Vitamin E 11103-57-4, Vitamin A
RL: FFD (Food or feed use); BIOL (Biological study); USES (Uses)
(composition containing polyunsatd. fatty acids and; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT 9005-25-8, Starch, biological studies
RL: FFD (Food or feed use); BIOL (Biological study); USES (Uses)
(corn, hydrolyzed; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT **446887-56-5**
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(nucleotide sequence; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT 112-80-1, Oleic acid, biological studies
RL: BCP (Biochemical process); FFD (Food or feed use); BIOL (Biological study); PROC (Process); USES (Uses)
(protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT 51901-23-6P, Fatty acid .DELTA.5-desaturase
RL: BPN (Biosynthetic preparation); BSU (Biological study, unclassified); FFD (Food or feed use); NUU (Other use, unclassified); PRP (Properties); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
(protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT 57-88-5, Cholesterol, biological studies 506-32-1, Arachidonic acid 6217-54-5, Docosahexaenoic acid
RL: BSU (Biological study, unclassified); BIOL (Biological study)
(protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT 60-33-3, 9,12-Octadecadienoic acid (9Z,12Z)-, biological studies 463-40-1, .alpha.-Linolenic acid 10417-94-4 24880-45-3
RL: BSU (Biological study, unclassified); FFD (Food or feed use); BIOL (Biological study); USES (Uses)

(protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)

IT 56-81-5, Glycerol, biological studies 57-10-3, Palmitic acid, biological studies 57-11-4, Stearic acid, biological studies 57-48-7, D-Fructose, biological studies 57-50-1, Sucrose, biological studies 58-56-0, Pyridoxine hydrochloride 58-85-5, Biotin 58-95-7, .alpha.-Tocopheryl acetate 59-30-3, Folic acid, biological studies 63-68-3, L-Methionine, biological studies 67-03-8, Thiamine chloride hydrochloride 67-48-1, Choline chloride 67-97-0, Vitamin D3 68-19-9, Cyanocobalamin 79-81-2, Vitamin A palmitate 83-88-5, Riboflavin, biological studies 84-80-0, Phylloquinone 87-89-8, myo-Inositol 98-92-0, Niacinamide 107-35-7, Taurine 124-07-2, Caprylic acid, biological studies 137-08-6, Calcium pantothenate 142-62-1, Caproic acid, biological studies 334-48-5, Capric acid 373-49-9, Palmitoleic acid 471-34-1, Calcium carbonate, biological studies 506-26-3, .gamma.-Linolenic acid 527-09-3, Copper gluconate 541-15-1, L-Carnitine 866-83-1, Potassium citrate 994-36-5, Sodium citrate 1309-48-4, Magnesium oxide, biological studies 1314-13-2, Zinc oxide, biological studies 1934-21-0 2783-94-0, FD&C Yellow #6 7235-40-7, .beta.-Carotene 7447-40-7, Potassium chloride, biological studies 7631-95-0, Sodium molybdate 7647-14-5, Sodium chloride, biological studies 7681-11-0, Potassium iodide, biological studies 7693-13-2, Calcium citrate 7720-78-7, Ferrous sulfate 7732-18-5, WATER, biological studies 7733-02-0, Zinc sulfate 7757-86-0 7758-11-4, Potassium phosphate dibasic 7758-87-4 7758-98-7, Cupric sulfate, biological studies 7778-77-0, Potassium phosphate monobasic 7785-87-7, Manganese sulfate 7786-30-3, Magnesium chloride, biological studies 9000-07-1, Carrageenan 9004-34-6, Cellulose, biological studies 9050-36-6, Maltodextrin 10045-86-0, Ferric orthophosphate 10102-18-8, Sodium selenite 25383-99-7, Sodium stearoyl lactylate 39345-92-1, Chromium chloride 71010-52-1, Gellan gum

RL: FFD (Food or feed use); BIOL (Biological study); USES (Uses)

(protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)

IT 446890-41-1, 1: PN: US6432684 SEQID: 2 unclaimed DNA 446890-42-2, 2: PN: US6432684 SEQID: 3 unclaimed DNA 446890-43-3, 3: PN: US6432684 SEQID: 4 unclaimed DNA 446890-44-4, 4: PN: US6432684 SEQID: 5 unclaimed DNA 446890-45-5, 5: PN: US6432684 SEQID: 6 unclaimed DNA 446890-46-6, 6: PN: US6432684 SEQID: 7 unclaimed DNA 446890-47-7, 7: PN: US6432684 SEQID: 8 unclaimed DNA 446890-51-3 446890-60-4 446890-61-5 446890-62-6 446890-63-7 446890-64-8 446890-65-9 446890-66-0 446890-67-1 446890-68-2 446890-69-3 446890-70-6 446890-71-7 446890-73-9 446890-74-0 446890-75-1

RL: PRP (Properties)

(unclaimed nucleotide sequence; human desaturase gene and uses thereof)

IT 446890-40-0 446890-48-8 446890-49-9 446890-50-2 446890-52-4 446890-53-5 446890-54-6 446890-55-7 446890-56-8 446890-57-9 446890-58-0 446890-59-1 446890-76-2 446890-77-3 446890-78-4 446890-79-5

RL: PRP (Properties)

(unclaimed protein sequence; human desaturase gene and uses thereof)

RE.CNT 13 THERE ARE 13 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

- (1) Anon; WO 9311245 1993 HCAPLUS
- (2) Anon; WO 9411516 1994 HCAPLUS
- (3) Anon; WO 9613591 1996 HCAPLUS
- (4) Anon; WO 9846765 1998 HCAPLUS
- (5) Anon; WO 0020603 2000 HCAPLUS
- (6) Anon; The Faseb Journal, Part 1, Abstract 3093, Experimental Biology 98 1998, PA532

- (7) Chaudhary; WO 9846763 A1 1998 HCAPLUS
 (8) Cho, H; Journal of Biological Chemistry 1999, V274(52), P37335 HCAPLUS
 (9) Cho, H; The Journal of Biological Chemistry 1999, V274(1), P471 HCAPLUS
 (10) Hitz; US 5443974 A 1995 HCAPLUS
 (11) Knutzon, D; The Journal of Biological Chemistry 1998, V273(45), P29360 HCAPLUS
 (12) Michaelson, L; Journal of Biological Chemistry 1998, V273(30), P19055 HCAPLUS
 (13) Thomas; US 5552306 A 1996 HCAPLUS
 IT **446887-56-5**
 RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
 (nucleotide sequence; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
 IT **68-19-9**, Cyanocobalamin
 RL: FFD (Food or feed use); BIOL (Biological study); USES (Uses)
 (protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)

L40 ANSWER 2 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN

AN **2002:588928** HCAPLUS

DN 137:151104

ED Entered STN: 08 Aug 2002

TI Protein and **cDNA sequences** of human
 .DELTA.5-desaturase gene and uses thereof

IN Mukerji, Pradip; Leonard, Amanda Eun-Yeong; Huang, Yung-Sheng;
 Parker-Barnes, Jennifer M.

PA Abbott Laboratories, USA

SO U.S., 104 pp., Cont.-in-part of U.S. Ser. No. 227,613.

CODEN: USXXAM

DT Patent

LA English

IC ICM C12P007-64

ICS C12P007-62; C12N009-02; C12N001-20; C07H021-04

NCL 435134000

CC 3-2 (Biochemical **Genetics**)

Section cross-reference(s): 7, 13

FAN.CNT 7

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|--|------|--------------|-----------------|--------------|
| PI | US 6428990 | B1 | 20020806 | US 1999-439261 | 19991112 <-- |
| | US 5972664 | A | 19991026 | US 1997-833610 | 19970411 <-- |
| | WO 9846765 | A1 | 19981022 | WO 1998-US7422 | 19980410 <-- |
| | W: | | | | |
| | AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, | | | | |
| | DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, | | | | |
| | KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, | | | | |
| | NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, | | | | |
| | UA, UG, US, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM | | | | |
| | RW: | | | | |
| | GH, GM, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, | | | | |
| | FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, | | | | |
| | CM, GA, GN, ML, MR, NE, SN, TD, TG | | | | |
| | US 6432684 | B1 | 20020813 | US 1999-227613 | 19990108 <-- |
| PRAI | US 1997-833610 | A2 | 19970411 <-- | | |
| | WO 1998-US7422 | A2 | 19980410 | | |
| | US 1999-227613 | A2 | 19990108 | | |
| AB | The present invention relates to the identification of a gene encoding .DELTA.5-desaturase involved in the desatn. of polyunsatd. fatty acids at carbon 5 and to uses thereof. In particular, the invention discloses the cDNA sequence of .DELTA.5-desaturase, vectors containing the sequence, and its expression in insect cells. The invention also discloses that human | | | | |

- .DELTA.5-desaturase may be utilized, for example, in the conversion of dihomogamma-linolenic acid (DGLA) to arachidonic acid (AA) and in the conversion of 20:4n-3 to eicosapentaenoic acid (EPA). The invention further discloses that AA or polyunsatd. fatty acids produced therefrom may be added to pharmaceutical compns., nutritional compns., animal feeds, as well as other products such as cosmetics.
- ST human desaturase cDNA sequence expression vector
- IT Insecta
(cell, .DELTA.5-desaturase can be expressed in; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT Genetic vectors
(comprising .DELTA.5-desaturase; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT Gene, animal
RL: BSU (Biological study, unclassified); BIOL (Biological study)
(encoding .DELTA.5-desaturase; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT Protein sequences
cDNA sequences
(of .DELTA.5-desaturase of human; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT Fatty acids, biological studies
RL: BPN (Biosynthetic preparation); BSU (Biological study, unclassified); BIOL (Biological study); PREP (Preparation)
(polyunsatd., .DELTA.5-desaturase producing; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT Human
Molecular cloning
(protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT 445055-60-7, Desaturase, fatty acid .DELTA.5- (human)
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(amino acid sequence; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT 506-32-1, Arachidonic acid 6217-54-5, Docosahexaenoic acid 10417-94-4, Eicosapentaenoic acid
RL: BSU (Biological study, unclassified); BIOL (Biological study)
(as product of .DELTA.5-desaturase; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT 1783-84-2, Dihomogamma-linolenic acid 2091-25-0, Adrenic acid 24880-40-8
RL: BSU (Biological study, unclassified); BIOL (Biological study)
(as substrate of .DELTA.5-desaturase; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT 103843-28-3, Desaturase
RL: BSU (Biological study, unclassified); BIOL (Biological study)
(for polyunsatd. fatty acid metabolism; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT 51901-23-6P, .DELTA.5-Desaturase
RL: BPN (Biosynthetic preparation); BSU (Biological study, unclassified); BIOL (Biological study); PREP (Preparation)
(gene encoding; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT **445055-58-3**
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(nucleotide sequence; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)
- IT 69403-06-1, Fatty acid elongase 94219-29-1, Fatty acid elongase

RL: BSU (Biological study, unclassified); BIOL (Biological study)
(protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)

IT 445055-70-9, 2: PN: US6428990 SEQID: 2 unclaimed DNA 445055-71-0, 3: PN: US6428990 SEQID: 3 unclaimed DNA 445055-72-1, 4: PN: US6428990 SEQID: 4 unclaimed DNA 445055-73-2, 5: PN: US6428990 SEQID: 5 unclaimed DNA 445055-74-3, 6: PN: US6428990 SEQID: 6 unclaimed DNA 445055-75-4, 7: PN: US6428990 SEQID: 7 unclaimed DNA 445055-76-5, 8: PN: US6428990 SEQID: 8 unclaimed DNA 445055-79-8 445055-89-0 445055-90-3 445055-91-4 445055-92-5 445055-93-6 445055-94-7 445055-95-8 445055-96-9 445055-97-0 445055-98-1 445055-99-2 445056-00-8 445056-01-9 445056-02-0 445056-03-1 445056-10-0 445056-11-1 445056-12-2 445056-13-3 445056-14-4 445056-15-5 445056-16-6 445056-17-7 445056-18-8 445056-19-9 445056-21-3 445056-22-4 445056-23-5 445056-24-6

RL: PRP (Properties)
(unclaimed nucleotide sequence; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)

IT 445055-77-6 445055-78-7 445055-80-1 445055-81-2 445055-82-3 445055-83-4 445055-84-5 445055-85-6 445055-86-7 445055-87-8 445055-88-9 445056-04-2 445056-05-3 445056-06-4 445056-07-5 445056-08-6 445056-09-7

RL: PRP (Properties)
(unclaimed protein sequence; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)

RE.CNT 13 THERE ARE 13 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE

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- (2) Anon; WO 9411516 1994 HCAPLUS
- (3) Anon; WO 9613591 1996 HCAPLUS
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- (5) Anon; WO 0020603 2000 HCAPLUS
- (6) Anon; The Faseb Journal, Abstracts, Part I, Abstract 3093, Experimental Biology 98 1998, PA532
- (7) Chaudhary; WO 9846763 A1 1998 HCAPLUS
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- (12) Michaelson, L; Journal of Biological Chemistry 1998, V273(30), P19055 HCAPLUS
- (13) Thomas; US 5552306 A 1996 HCAPLUS

IT 445055-58-3

RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(nucleotide sequence; protein and cDNA sequences of human .DELTA.5-desaturase gene and uses thereof)

L40 ANSWER 3 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 2000:253045 HCAPLUS

DN 132:289568

ED Entered STN: 20 Apr 2000

TI Methods and compositions for synthesis of long chain poly-unsaturated fatty acids in plants by expression of *Mortierella alpina* fatty acid desaturases

IN Knutzon, Deborah

PA Abbott Laboratories, USA; Calgene, LLC

SO U.S., 52 pp., Cont.-in-part of U.S. Ser. No. 834,033.
CODEN: USXXAM

DT Patent
 LA English
 IC ICM C12N015-82
 ICS C12N005-04; C07H021-04
 NCL 800281000
 CC 3-1 (Biochemical **Genetics**)
 Section cross-reference(s): 7, 11

FAN.CNT 7

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|--|------|----------|-----------------|--------------|
| PI | US 6051754 | A | 20000418 | US 1997-956985 | 19971024 <-- |
| | US 5972664 | A | 19991026 | US 1997-833610 | 19970411 <-- |
| | US 6075183 | A | 20000613 | US 1997-834033 | 19970411 <-- |
| | WO 9846764 | A1 | 19981022 | WO 1998-US7421 | 19980410 <-- |
| | W: | | | | |
| | AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, US, US, US, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM | | | | |
| | RW: | | | | |
| | GH, GM, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG | | | | |
| | AU 9871147 | A1 | 19981111 | AU 1998-71147 | 19980410 <-- |
| | AU 720677 | B2 | 20000608 | | |
| | TR 9902474 | T2 | 20000221 | TR 1999-9902474 | 19980410 <-- |
| | EP 996732 | A1 | 20000503 | EP 1998-918174 | 19980410 <-- |
| | R: | | | | |
| | AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, FI, RO | | | | |
| | BR 9808506 | A | 20000523 | BR 1998-8506 | 19980410 <-- |
| | NZ 337459 | A | 20000728 | NZ 1998-337459 | 19980410 <-- |
| | JP 2001527395 | T2 | 20011225 | JP 1998-544175 | 19980410 <-- |
| | NO 9904926 | A | 19991130 | NO 1999-4926 | 19991008 <-- |
| | MX 9909328 | A | 20000930 | MX 1999-9328 | 19991011 <-- |
| PRAI | US 1997-833610 | A2 | 19970411 | <-- | |
| | US 1997-834033 | A2 | 19970411 | <-- | |
| | US 1997-834655 | A2 | 19970411 | <-- | |
| | US 1997-956985 | A2 | 19971024 | <-- | |
| | WO 1998-US7421 | W | 19980410 | | |
| AB | <p>The present invention relates to compns. and methods for preparing poly-unsatd. long chain fatty acids in plants, plant parts and plant cells, such as leaves, roots, fruits and seeds. Nucleic acid sequences and constructs encoding fatty acid desaturases, including .DELTA.5-desaturases, .DELTA.6-desaturases and .DELTA.12-desaturases, from fungus, <i>Mortierella alpina</i>, operably linked to a promoter, are used to generate transgenic plants, plant parts and cells as well as microbial cells. Expression of the desaturases with different substrate specificities in the plant system permit the large scale production of poly-unsatd. long chain fatty acids such as docosahexaenoic acid (DHA), eicosapentaenoic acid (EPA), .alpha.-linoleic acid (ALA), gamma-linolenic acid (GLA), arachidonic acid (ARA) and the like for modification of the fatty acid profile of plants, plant parts and tissues. Manipulation of the fatty acid profiles allows for the production of com. quantities of novel plant oils and products. <i>Mortierella alpina</i> cDNA clones having sequence homol. to .DELTA.5-desaturases, .DELTA.6-desaturases and .DELTA.12-desaturases, were isolated and sequenced. Expression constructs for these sequences were generated and introduced into yeast cells, Brassica leaves, and Brassica napus seeds. Fatty acid composition anal. of transgenic plant cells showed that those cDNA sequences do indeed code for .DELTA.5-, .DELTA.6-, and .DELTA.12-desaturases, and could be expressed in</p> | | | | |

- heterologous system to produce ARA from DGLA, GLA, and 18:2 fatty acid.
- ST sequence Mortierella fatty acid desaturase cDNA; synthesis poly unsatd fatty acid plant Mortierella desaturase; PUFA synthesis plant fungal desaturase gene expression
- IT Promoter (genetic element)
 RL: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses)
 (35S, for expression of Mortierella fatty acid desaturases; methods and compns. for synthesis of long chain poly-unsatd. fatty acids in plants by expression of Mortierella alpina fatty acid desaturases)
- IT Gene, microbial
 RL: AGR (Agricultural use); PRP (Properties); BIOL (Biological study); USES (Uses)
 (for fatty acid desaturases of Mortierella, expression in transgenic plants of; methods and compns. for synthesis of long chain poly-unsatd. fatty acids in plants by expression of Mortierella alpina fatty acid desaturases)
- IT Brassica
 (leaves, transgenic; methods and compns. for synthesis of long chain poly-unsatd. fatty acids in plants by expression of Mortierella alpina fatty acid desaturases)
- IT Fungi
 Genetic vectors
 Mortierella
 Mortierella alpina
 Protein sequences
cDNA sequences
 (methods and compns. for synthesis of long chain poly-unsatd. fatty acids in plants by expression of Mortierella alpina fatty acid desaturases)
- IT Promoter (genetic element)
 RL: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses)
 (methods and compns. for synthesis of long chain poly-unsatd. fatty acids in plants by expression of Mortierella alpina fatty acid desaturases)
- IT Fatty acids, preparation
 RL: BPN (Biosynthetic preparation); BIOL (Biological study); PREP (Preparation)
 (polyunsatd.; methods and compns. for synthesis of long chain poly-unsatd. fatty acids in plants by expression of Mortierella alpina fatty acid desaturases)
- IT Brassica napus
 (strain LP004, transgenic; methods and compns. for synthesis of long chain poly-unsatd. fatty acids in plants by expression of Mortierella alpina fatty acid desaturases)
- IT Embryo, plant
 Plant cell
 Prokaryote
 Saccharomyces cerevisiae
 Seed
 (transgenic; methods and compns. for synthesis of long chain poly-unsatd. fatty acids in plants by expression of Mortierella alpina fatty acid desaturases)
- IT Fats and Glyceridic oils, biological studies
 RL: AGR (Agricultural use); BIOL (Biological study); USES (Uses)
 (vegetable; methods and compns. for synthesis of long chain poly-unsatd. fatty acids in plants by expression of Mortierella alpina fatty acid desaturases)
- IT 214970-47-5P, **Desaturase, linoleate** (Mortierella

alpina clone Ma524) 214970-49-7P 214971-48-9P, Desaturase, fatty acid
 .DELTA.5- (Mortierella alpina clone Ma29)
 RL: BAC (Biological activity or effector, except adverse); BOC (Biological occurrence); BPN (Biosynthetic preparation); BSU (Biological study, unclassified); BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); OCCU (Occurrence); PREP (Preparation); USES (Uses)
 (amino acid sequence; methods and compns. for synthesis of long chain poly-unsatd. fatty acids in plants by expression of Mortierella alpina fatty acid desaturases)

IT **9082-66-0P, .DELTA.6-Desaturase**

51901-23-6P, .DELTA.5-Desaturase 84628-81-9P
 RL: BAC (Biological activity or effector, except adverse); BOC (Biological occurrence); BPN (Biosynthetic preparation); BSU (Biological study, unclassified); BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); OCCU (Occurrence); PREP (Preparation); USES (Uses)
 (methods and compns. for synthesis of long chain poly-unsatd. fatty acids in plants by expression of Mortierella alpina fatty acid desaturases)

IT 60-33-3P, .alpha.-Linoleic acid, preparation 506-26-3P,
 .gamma.-Linolenic acid 506-32-1P, Arachidonic acid 16833-54-8P,
 Pinolenic acid 26549-54-2P, Taxoleic acid
 RL: BPN (Biosynthetic preparation); BIOL (Biological study); PREP (Preparation)

(methods and compns. for synthesis of long chain poly-unsatd. fatty acids in plants by expression of Mortierella alpina fatty acid desaturases)

IT 1783-84-2, DGLA

RL: BPR (Biological process); BSU (Biological study, unclassified); BIOL (Biological study); PROC (Process)
 (methods and compns. for synthesis of long chain poly-unsatd. fatty acids in plants by expression of Mortierella alpina fatty acid desaturases)

IT **214970-46-4, DNA (Mortierella alpina clone Ma524 linoleate desaturase cDNA plus flanks) 214970-48-6**

214971-47-8, DNA (Mortierella alpina clone Ma29 fatty acid .DELTA.5-desaturase cDNA plus flanks)
 RL: BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
 (nucleotide sequence; methods and compns. for synthesis of long chain poly-unsatd. fatty acids in plants by expression of Mortierella alpina fatty acid desaturases)

IT 186071-32-9, PN: US5968791 SEQID: 16 unclaimed DNA 263380-67-2
 263380-68-3 264116-34-9, 7: PN: US6051754 SEQID: 20 unclaimed DNA
 264116-35-0, 8: PN: US6051754 SEQID: 21 unclaimed DNA 264116-36-1
 264116-37-2

RL: PRP (Properties)
 (unclaimed nucleotide sequence; methods and compns. for synthesis of long chain poly-unsatd. fatty acids in plants by expression of Mortierella alpina fatty acid desaturases)

IT 148734-39-8 263380-60-5 263380-61-6 263380-62-7 263380-64-9
 263380-65-0 263380-66-1 264116-32-7 264116-33-8 264116-38-3
 264116-39-4 264129-54-6 264129-56-8

RL: PRP (Properties)
 (unclaimed protein sequence; methods and compns. for synthesis of long chain poly-unsatd. fatty acids in plants by expression of Mortierella alpina fatty acid desaturases)

RE.CNT 47 THERE ARE 47 CITED REFERENCES AVAILABLE FOR THIS RECORD

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- (3) Anon; EP 550162 1993 HCAPLUS
- (4) Anon; EP 561569 1993 HCAPLUS
- (5) Anon; WO 93/06712 1993 HCAPLUS
- (6) Anon; WO 93/11245 1993 HCAPLUS
- (7) Anon; WO 94/11516 1994 HCAPLUS
- (8) Anon; WO 94/18337 1994 HCAPLUS
- (9) Anon; EP 644263 1995 HCAPLUS
- (10) Anon; EP 736598 1996 HCAPLUS
- (11) Anon; WO 96/10086 1996 HCAPLUS
- (12) Anon; WO 96/21022 1996 HCAPLUS
- (13) Anon; WO 97/30582 1997 HCAPLUS
- (14) Anon; Lipid Technology 1996
- (15) Anon; Lipid Technology 1997
- (16) Anon; The Gist 1995, V61, P8
- (17) Bajpai; Biotechnology and Applied Biochemistry 1992, V15, P1 HCAPLUS
- (18) Bernhart; US 3649295 1972 HCAPLUS
- (19) Cahoon; US 5614400 1997 HCAPLUS
- (20) Clandinin; US 4670285 1987 HCAPLUS
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- (22) Gotschlich; US 5545553 1996 HCAPLUS
- (23) Gurr; Lipid Technology 1995
- (24) Hitz; US 5443974 1995 HCAPLUS
- (25) Hodgson; Ex Opin Ther Patents 1995, V5(5), P45
- (26) Horrobin; INFORM 1995, V6(4), P428
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- (28) Kawashima; US 5376541 1994 HCAPLUS
- (29) Kyle; US 5374657 1994 HCAPLUS
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- (31) Kyle; US 5492938 1996 HCAPLUS
- (32) Kyle; US 5550156 1996 HCAPLUS
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Medicine P22
- (35) Ratledge; MB Tech 1995, P11
- (36) Reddy; Nature Biotechnology 1996, V14, P639 HCAPLUS
- (37) Rubin; US 4526902 1985 HCAPLUS
- (38) Rubin; US 4843095 1989 HCAPLUS
- (39) Rule; US 4614663 1986 HCAPLUS
- (40) Tagaki; Lipids 1982, V17(10), P716
- (41) Thomas; US 5552306 1996 HCAPLUS
- (42) Thomas; US 5614393 1997 HCAPLUS
- (43) Traitler; US 4938984 1990 HCAPLUS
- (44) Voelker; US 5512482 1996 HCAPLUS
- (45) Ward; Inform 1995, V6(6), P683
- (46) Willliams; US 4058594 1977
- (47) Wolff; Inform 1997, V8(1), P116
- IT **9082-66-0P, .DELTA.6-Desaturase**
 RL: BAC (Biological activity or effector, except adverse); BOC (Biological occurrence); BPN (Biosynthetic preparation); BSU (Biological study, unclassified); BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); OCCU (Occurrence); PREP (Preparation); USES (Uses)
 (methods and compns. for synthesis of long chain poly-unsatd. fatty acids in plants by expression of Mortierella alpina fatty acid desaturases)
- IT **214970-46-4, DNA (Mortierella alpina clone Ma524 linoleate desaturase cDNA plus flanks) 214970-48-6**
214971-47-8, DNA (Mortierella alpina clone Ma29 fatty acid .DELTA.5-desaturase cDNA plus flanks)
 RL: BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)

(nucleotide sequence; methods and compns. for synthesis of long chain poly-unsatd. fatty acids in plants by expression of *Mortierella alpina* fatty acid desaturases)

L40 ANSWER 4 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1999:582690 HCAPLUS

DN 131:224474

ED Entered STN: 16 Sep 1999

TI Sequences encoding .DELTA.-15 fatty acid desaturase genes and enzymes, and uses thereof in altering the **lipid content** of plants, in screening for related enzymes, and in RFLP mapping

IN Browse, John; Grau, Luis Perez; Kinney, Anthony J.; Pierce, John W., Jr.; Wierzbicki, Anna M.; Yadav, Narendra S.

PA E. I. Du Pont de Nemours & Co., USA

SO U.S., 57 pp., Cont.-in-part of U.S. Ser. No. 804,259, abandoned.

CODEN: USXXAM

DT Patent

LA English

IC ICM A01H005-00

ICS C12N015-82

NCL 800295000

CC 3-3 (Biochemical **Genetics**)

Section cross-reference(s): 7, 11

FAN.CNT 2

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|--|------|----------|-----------------|--------------|
| PI | US 5952544 | A | 19990914 | US 1994-244205 | 19940826 <-- |
| | WO 9311245 | A1 | 19930610 | WO 1992-US10284 | 19921203 <-- |
| | W: AU, BR, CA, JP, RU, UA, US | | | | |
| | RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE | | | | |
| PRAI | US 1991-804259 | B2 | 19911204 | <-- | |
| | WO 1992-US10284 | W | 19921203 | <-- | |

AB The invention provides protein and cDNA sequences encoding fatty acid desaturases from various plant species, and relates to uses thereof in modifying fatty acid composition in said plants. Specifically, .DELTA.-15 fatty acid desaturase genes and enzymes from *Arabidopsis thaliana*, *Brassica napus*, *Zea mays*, and *Glycine max* are disclosed. The invention primarily relates to the use of the disclosed nucleic acids in preparing chimeric genes capable of causing altered levels of linolenic acid in a transgenic oil-producing plant, especially in the seeds of said plant. The invention also relates to the use of fragments of the provided nucleic acid sequences as probes to isolate related glycerolipid desaturase genes from the same or different species of plant. Addnl., the provided nucleic acid sequences can be used as restriction fragment length polymorphism (RFLP) markers in *Arabidopsis* genetic mapping and plant breeding programs.

ST cDNA sequence fatty acid desaturase *Arabidopsis* *Brassica* corn soybean; transgenic plant seed linolenic acid compn fatty acid desaturase; RFLP mapping *Arabidopsis* fatty acid desaturase

IT Gene, plant

RL: AGR (Agricultural use); BPN (Biosynthetic preparation); BIOL

(Biological study); PREP (Preparation); USES (Uses)

(chimeric, uses in alteration of linolenic acid; sequences encoding .DELTA.-15 fatty acid desaturase genes and enzymes, and uses thereof in altering the lipid content of plants)

IT *Brassica napus*

Cotton

Peanut (*Arachis hypogaea*)

Sunflower

(containing altered levels of linolenic acid; sequences encoding .DELTA.-15 fatty acid desaturase genes and enzymes, and uses thereof in altering

- the lipid content of plants)
- IT Gene, plant
 RL: AGR (Agricultural use); BOC (Biological occurrence); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); OCCU (Occurrence); USES (Uses)
 (encoding .DELTA.-15 fatty acid desaturases; sequences encoding .DELTA.-15 fatty acid desaturase genes and enzymes, and uses thereof in altering the lipid content of plants)
- IT Plant (Embryophyta)
 (oilseed, alteration of linolenic acid content in; sequences encoding .DELTA.-15 fatty acid desaturase genes and enzymes, and uses thereof in altering the lipid content of plants, in screening for related enzymes, and in RFLP mapping)
- IT Seed
 (oilseed, containing altered levels of linolenic acid; sequences encoding .DELTA.-15 fatty acid desaturase genes and enzymes, and uses thereof in altering the lipid content of plants)
- IT Chimeric gene
 RL: AGR (Agricultural use); BPN (Biosynthetic preparation); BIOL (Biological study); PREP (Preparation); USES (Uses)
 (plant, uses in alteration of linolenic acid; sequences encoding .DELTA.-15 fatty acid desaturase genes and enzymes, and uses thereof in altering the lipid content of plants)
- IT **Genetic engineering**
 Protein sequences
 RFLP (restriction fragment length polymorphism)
cDNA sequences
 (sequences encoding .DELTA.-15 fatty acid desaturase genes and enzymes, and uses thereof in altering the lipid content of plants, in screening for related enzymes, and in RFLP mapping)
- IT **Probes (nucleic acid)**
 RL: ARG (Analytical reagent use); ANST (Analytical study); USES (Uses)
 (sequences encoding .DELTA.-15 fatty acid desaturase genes and enzymes, and uses thereof in screening for related enzymes)
- IT Arabidopsis thaliana
 Brassica
 Corn
 Microsome
 Plastid
 Soybean (Glycine max)
 (.DELTA.-15 fatty acid desaturase from; sequences encoding .DELTA.-15 fatty acid desaturase genes and enzymes, and uses thereof in altering the lipid content of plants, in screening for related enzymes, and in RFLP mapping)
- IT 149955-96-4 149955-97-5 149955-98-6 149955-99-7 149956-00-3
 149956-01-4 149956-02-5 149956-03-6
 RL: AGR (Agricultural use); BAC (Biological activity or effector, except adverse); BOC (Biological occurrence); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); OCCU (Occurrence); USES (Uses)
 (amino acid sequence; sequences encoding .DELTA.-15 fatty acid desaturase genes and enzymes, and uses thereof)
- IT 243144-79-8 243144-80-1 243144-81-2 243144-82-3 243144-83-4
 RL: AGR (Agricultural use); BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); BIOL (Biological study); USES (Uses)
 (amino acid sequence; sequences encoding .DELTA.-15 fatty acid desaturase genes and enzymes, and uses thereof)
- IT 149955-89-5 149955-90-8 149955-91-9
 149955-92-0 149955-93-1 149955-94-2, DNA (corn

clone pPCR20 fatty acid .DELTA.15-desaturase fragment-specifying)
149955-95-3, DNA (Arabidopsis thaliana clone pFadx-2 fatty acid
 .DELTA.15-desaturase fragment-specifying) **243855-99-4**
 RL: AGR (Agricultural use); BOC (Biological occurrence); BSU (Biological
 study, unclassified); PRP (Properties); BIOL (Biological study); OCCU
 (Occurrence); USES (Uses)

(nucleotide sequence; sequences encoding .DELTA.-15 fatty acid
 desaturase genes and enzymes, and uses thereof)

IT 463-40-1, Linolenic acid
 RL: BOC (Biological occurrence); BSU (Biological study, unclassified);
 BIOL (Biological study); OCCU (Occurrence)
 (sequences encoding .DELTA.-15 fatty acid desaturase genes and enzymes,
 and uses thereof in altering the lipid content of plants, in screening
 for related enzymes, and in RFLP mapping)

IT 243856-46-4, PN: US5952544 SEQID: 23 unclaimed DNA 243856-47-5, PN:
 US5952544 SEQID: 24 unclaimed DNA 243856-48-6, PN: US5952544 SEQID: 25
 unclaimed DNA 243856-49-7, PN: US5952544 SEQID: 26 unclaimed DNA
 243856-50-0, PN: US5952544 SEQID: 27 unclaimed DNA 243856-51-1, PN:
 US5952544 SEQID: 28 unclaimed DNA 243856-52-2, PN: US5952544 SEQID: 29
 unclaimed DNA 243856-53-3, PN: US5952544 SEQID: 30 unclaimed DNA
 243856-54-4, PN: US5952544 SEQID: 31 unclaimed DNA 243856-55-5, PN:
 US5952544 SEQID: 32 unclaimed DNA
 RL: PRP (Properties)

(unclaimed nucleotide sequence; sequences encoding .DELTA.-15 fatty
 acid desaturase genes and enzymes, and uses thereof in altering the
 lipid content of plants, in screening for related enzymes, and in RFLP
 mapping)

IT 9014-34-0, Fatty acid desaturase
 RL: AGR (Agricultural use); BAC (Biological activity or effector, except
 adverse); BOC (Biological occurrence); BSU (Biological study,
 unclassified); PRP (Properties); BIOL (Biological study); OCCU
 (Occurrence); USES (Uses)

(.DELTA.-15; sequences encoding .DELTA.-15 fatty acid desaturase genes
 and enzymes, and uses thereof in altering the lipid content of plants,
 in screening for related enzymes, and in RFLP mapping)

RE.CNT 23 THERE ARE 23 CITED REFERENCES AVAILABLE FOR THIS RECORD
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 IT 149955-89-5 149955-90-8 149955-91-9
 149955-92-0 149955-93-1 149955-94-2, DNA (corn
 clone pPCR20 fatty acid .DELTA.15-desaturase fragment-specifying)
 149955-95-3, DNA (Arabidopsis thaliana clone pFadx-2 fatty acid
 .DELTA.15-desaturase fragment-specifying) 243855-99-4
 RL: AGR (Agricultural use); BOC (Biological occurrence); BSU (Biological
 study, unclassified); PRP (Properties); BIOL (Biological study); OCCU
 (Occurrence); USES (Uses)
 (nucleotide sequence; sequences encoding .DELTA.-15 fatty acid
 desaturase genes and enzymes, and uses thereof)

L40 ANSWER 5 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN
 AN 1999:464065 HCAPLUS
 DN 131:84842
 ED Entered STN: 29 Jul 1999
 TI Cloning, **sequencing**, expression and use of .DELTA.5-fatty acid
 desaturases
 IN Napier, Johnathan A.; Michaelson, Louise; Stobart, Keith
 PA University of Bristol, UK
 SO PCT Int. Appl., 36 pp.
 CODEN: PIXXD2
 DT Patent
 LA English
 IC ICM C12N009-00
 CC 7-5 (Enzymes)
 Section cross-reference(s): 3, 10, 12, 16, 17, 63
 FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|---|--|----------|-------------------|--------------|
| PI | WO 9933958 | A2 | 19990708 | WO 1998-GB3895 | 19981223 <-- |
| | WO 9933958 | A3 | 19990902 | | |
| | W: | AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM | | | |
| | RW: | GH, GM, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG | | | |
| | ZA 9811821 | A | 19990629 | ZA 1998-11821 | 19981223 <-- |
| | CA 2315297 | AA | 19990708 | CA 1998-2315297 | 19981223 <-- |
| | AU 9917748 | A1 | 19990719 | AU 1999-17748 | 19981223 <-- |
| | EP 1042485 | A2 | 20001011 | EP 1998-962620 | 19981223 <-- |
| | R: | AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI | | | |
| | BR 9814434 | A | 20011023 | BR 1998-14434 | 19981223 <-- |
| | EE 200000372 | A | 20011217 | EE 2000-200000372 | 19981223 <-- |
| | JP 2002508932 | T2 | 20020326 | JP 2000-526616 | 19981223 <-- |
| | US 2003152983 | A1 | 20030814 | US 2003-340779 | 20030113 <-- |
| PRAI | GB 1997-27256 | A | 19971223 | <-- | |
| | GB 1998-14034 | A | 19980629 | | |
| | WO 1998-GB3895 | W | 19981223 | | |
| | US 2000-582034 | A1 | 20001219 | | |
| AB | This invention relates to cDNA sequences encoding .DELTA.5-fatty acid desaturases of <i>Mortierella alpina</i> and <i>Caenorhabditis elegans</i> , the encoded .DELTA.5-fatty acid desaturases, and applications for the .DELTA.5-fatty acid desaturases. A method of converting di-homo-.gamma.-linolenic acid to arachidonic acid catalyzed by the .DELTA.5-fatty acid desaturases is | | | | |

reported. This invention relates also to expression of the recombinant .DELTA.5-fatty acid desaturases of *M. alpina* and *C. elegans* in yeast, phycomycetes and oil seed plants and tobacco. The invention provides also a method of producing polyunsatd. fatty acids using the .DELTA.5-fatty acid desaturases. The invention provides a foodstuff, dietary supplement and pharmaceutical preparation containing a polyunsatd. fatty acid produced by

the

.DELTA.5-fatty acid desaturases.

ST fatty acid desaturase cDNA sequence *Mortierella Caenorhabditis*; polyunsatd fatty acid food supplement pharmaceutical

IT Algae

Bacteria (Eubacteria)

Beaver (Castor)

Borago officinalis

Caenorhabditis elegans

Coconut (*Cocos nucifera*)

Corn

Cotton

Drugs

Evening primrose (*Oenothera*)

Feed additives

Flaxseed

Fungi

Metabolic pathways

Microorganism

Molecular cloning

Mortierella alpina

Mustard (*Brassica*)

Oil palm (*Elaeis*)

Palm (*Arecaceae*)

Peanut (*Arachis hypogaea*)

Plant (*Embryophyta*)

Protein sequences

Rape (plant)

Regiochemistry

Safflower (*Carthamus tinctorius*)

Sesame (*Sesamum indicum*)

Soybean (*Glycine max*)

Sunflower

Tobacco

Yeast

cDNA sequences

(cloning, sequencing, expression and use of .DELTA.5-fatty acid desaturases)

IT Prostaglandins

Transgene

RL: BPN (Biosynthetic preparation); BIOL (Biological study); PREP (Preparation)

(cloning, sequencing, expression and use of .DELTA.5-fatty acid desaturases)

IT **Probes (nucleic acid)**

RL: BPN (Biosynthetic preparation); BUU (Biological use, unclassified); BIOL (Biological study); PREP (Preparation); USES (Uses)

(cloning, sequencing, expression and use of .DELTA.5-fatty acid desaturases)

IT Plant (*Embryophyta*)

(oilseed; cloning, sequencing, expression and use of .DELTA.5-fatty acid desaturases)

IT Fungi

(phycomycetous; cloning, sequencing, expression and use of

- .DELTA.5-fatty acid desaturases)
- IT Fatty acids, biological studies
 RL: BPN (Biosynthetic preparation); FFD (Food or feed use); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
 (polyunsatd.; cloning, sequencing, expression and use of .DELTA.5-fatty acid desaturases)
- IT 219903-35-2
 RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
 (amino acid sequence; cloning, sequencing, expression and use of .DELTA.5-fatty acid desaturases)
- IT 51901-23-6P, .DELTA.5-Fatty acid desaturase
 RL: BAC (Biological activity or effector, except adverse); BPN (Biosynthetic preparation); BSU (Biological study, unclassified); BUU (Biological use, unclassified); CAT (Catalyst use); PRP (Properties); BIOL (Biological study); PREP (Preparation); USES (Uses)
 (cloning, sequencing, expression and use of .DELTA.5-fatty acid desaturases)
- IT 506-32-1P, Arachidonic acid
 RL: BPN (Biosynthetic preparation); BSU (Biological study, unclassified); MFM (Metabolic formation); BIOL (Biological study); FORM (Formation, nonpreparative); PREP (Preparation)
 (cloning, sequencing, expression and use of .DELTA.5-fatty acid desaturases)
- IT 1783-84-2, Di-homo-.gamma.-linolenic acid
 RL: BPR (Biological process); BSU (Biological study, unclassified); RCT (Reactant); BIOL (Biological study); PROC (Process); RACT (Reactant or reagent)
 (cloning, sequencing, expression and use of .DELTA.5-fatty acid desaturases)
- IT 211400-14-5 212508-56-0
 RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
 (cloning, sequencing, expression and use of .DELTA.5-fatty acid desaturases)
- IT 219628-90-7, GenBank AF078796
 RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
 (nucleotide sequence; cloning, sequencing, expression and use of .DELTA.5-fatty acid desaturases)
- IT 211400-14-5
 RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
 (cloning, sequencing, expression and use of .DELTA.5-fatty acid desaturases)
- IT 219628-90-7, GenBank AF078796
 RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
 (nucleotide sequence; cloning, sequencing, expression and use of .DELTA.5-fatty acid desaturases)
- L40 ANSWER 6 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN
 AN 1999:359666 HCAPLUS
 DN 131:15716
 ED Entered STN: 11 Jun 1999
 TI Cloning and expression of a nematode .DELTA.6
 -desaturase cDNA and its uses
 IN Napier, Johnathan A.
 PA University of Bristol, UK

SO PCT Int. Appl., 44 pp.
 CODEN: PIXXD2
 DT Patent
 LA English
 IC ICM C12N015-53
 ICS C12N015-82; C12N009-02; C12Q001-26; G01N033-53; A61K038-44;
 C07K016-40; C12P007-64; C12N005-10; A01H005-00; C12Q001-68

CC 7-2 (Enzymes)

Section cross-reference(s): 12

FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|----------------|------|--------------|--|--------------|
| PI | WO 9927111 | A1 | 19990603 | WO 1998-GB3507 | 19981124 <-- |
| | W: | | | AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM | |
| | RW: | | | GH, GM, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG | |
| | CA 2311472 | AA | 19990603 | CA 1998-2311472 | 19981124 <-- |
| | AU 9912497 | A1 | 19990615 | AU 1999-12497 | 19981124 <-- |
| | AU 762750 | B2 | 20030703 | | |
| | ZA 9810716 | A | 19990616 | ZA 1998-10716 | 19981124 <-- |
| | EP 1032682 | A1 | 20000906 | EP 1998-955769 | 19981124 <-- |
| | R: | | | AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI | |
| | EE 200000304 | A | 20010615 | EE 2000-200000304 | 19981124 <-- |
| | JP 2002505848 | T2 | 20020226 | JP 2000-522252 | 19981124 <-- |
| PRAI | GB 1997-24783 | A | 19971124 <-- | | |
| | WO 1998-GB3507 | W | 19981124 | | |

AB A cDNA encoding a .DELTA.6-desaturase of Caenorhabditis elegans has been cloned and sequenced, and the amino acid sequence of the enzyme has been determined. The C. elegans .DELTA.6 desaturase has a surprisingly low level of sequence identity with the known borage .DELTA.6 desaturase. The C. elegans .DELTA.6 desaturase has been expressed in yeast. It and other desaturases can be cloned in host organisms (e.g. plants) and can be used to provide useful metabolites. The gene was first identified by searching of EST databases for homologs of the borage .DELTA.6 desaturase. A full-length cDNA was cloned and the identity of the enzyme was confirmed by expression in Saccharomyces cerevisiae using the synthesis of .gamma.-linolenic acid as a marker. Expression of the cDNA in Arabidopsis thaliana led to the appearance of .gamma.-linolenic acid and octadecatetraenoic acid.

ST delta6 desaturase cDNA Caenorhabditis; **linoleate desaturase** cDNA Caenorhabditis

IT Gene, animal

RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)

(cDNA; cloning and expression of nematode .DELTA.6-**desaturase** cDNA and its uses)

IT Caenorhabditis elegans

(cloning and expression of nematode .DELTA.6-**desaturase** cDNA and its uses)

IT Stress, animal

Stress, plant

(cold, .DELTA.6-**desaturase** and resistance to; cloning and expression of nematode .DELTA.6-**desaturase** cDNA and its uses)

- IT Artery, disease
(coronary, manufacture of polyunsatd. fatty acids for treatment of; cloning and expression of nematode **.DELTA.6-desaturase** cDNA and its uses)
- IT Nerve, disease
(diabetic neuropathy, manufacture of polyunsatd. fatty acids for treatment of; cloning and expression of nematode **.DELTA.6-desaturase** cDNA and its uses)
- IT Mammary gland
(disease, mastalgia, manufacture of polyunsatd. fatty acids for treatment of; cloning and expression of nematode **.DELTA.6-desaturase** cDNA and its uses)
- IT Eicosanoids
RL: BPN (Biosynthetic preparation); BIOL (Biological study); PREP (Preparation)
(enzymic preparation for therapeutic use of; cloning and expression of nematode **.DELTA.6-desaturase** cDNA and its uses)
- IT Borago officinalis
Castor bean
Cereal (grain)
Coconut (Cocos nucifera)
Corn
Cotton
Cruciferae (Brassicaceae)
Evening primrose (Oenothera)
Flaxseed
Legume (Fabaceae)
Oil palm (Elaeis)
Palm (Arecaceae)
Peanut (Arachis hypogaea)
Rape (plant)
Safflower (Carthamus tinctorius)
Sesame (Sesamum indicum)
Soybean (Glycine max)
Sunflower
Tobacco
(expression host; cloning and expression of nematode **.DELTA.6-desaturase** cDNA and its uses)
- IT Genetic markers
(for transformation, **.DELTA.6-desaturase** of *Caenorhabditis* as; cloning and expression of nematode **.DELTA.6-desaturase** cDNA and its uses)
- IT cDNA sequences
(for **.DELTA.6-desaturase** of *Caenorhabditis*; cloning and expression of nematode **.DELTA.6-desaturase** cDNA and its uses)
- IT Acne
Atherosclerosis
Cirrhosis
Eczema
Hypercholesterolemia
Hypertension
Neoplasm
(manufacture of polyunsatd. fatty acids for treatment of; cloning and expression of nematode **.DELTA.6-desaturase** cDNA and its uses)
- IT Protein motifs
Protein sequences
(of **.DELTA.6-desaturase** of

- Caenorhabditis; cloning and expression of nematode **.DELTA.6-desaturase** cDNA and its uses)
- IT Antibodies
RL: BSU (Biological study, unclassified); THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(to **.DELTA.6-desaturase** of Caenorhabditis; cloning and expression of nematode **.DELTA.6-desaturase** cDNA and its uses)
- IT Infection
(viral, manufacture of polyunsatd. fatty acids for treatment of; cloning and expression of nematode **.DELTA.6-desaturase** cDNA and its uses)
- IT 207522-01-8
RL: BSU (Biological study, unclassified); PRP (Properties); THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(amino acid sequence; cloning and expression of nematode **.DELTA.6-desaturase** cDNA and its uses)
- IT 9082-66-0, **.DELTA.6-Desaturase**
RL: BSU (Biological study, unclassified); BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
(cloning and expression of nematode **.DELTA.6-desaturase** cDNA and its uses)
- IT 506-26-3P, .gamma.-Linolenic acid 81275-46-9P, Octadecatetraenoic acid
RL: BPN (Biosynthetic preparation); BIOL (Biological study); PREP (Preparation)
(enzymic preparation for therapeutic use of; cloning and expression of nematode **.DELTA.6-desaturase** cDNA and its uses)
- IT 207217-27-4
RL: BSU (Biological study, unclassified); BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
(nucleotide sequence; cloning and expression of nematode **.DELTA.6-desaturase** cDNA and its uses)
- RE.CNT 17 THERE ARE 17 CITED REFERENCES AVAILABLE FOR THIS RECORD
- RE
- (1) Abbott Lab; EP 0400547 A 1990 HCAPLUS
 - (2) Efamol Holdings; EP 0454102 A 1991 HCAPLUS
 - (3) Headon, D; EP 0410637 A 1991
 - (4) Hillier, L; EMBL Accession No R05219 1995
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 - (15) Tanaka, T; Lipids 1996, V31(11), P1173 HCAPLUS
 - (16) Thurmond J; WO 9846763 A 1998 HCAPLUS
 - (17) Thurmond J; WO 9846764 A 1998 HCAPLUS
- IT 9082-66-0, **.DELTA.6-Desaturase**
RL: BSU (Biological study, unclassified); BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
(cloning and expression of nematode **.DELTA.6-desaturase** cDNA and its uses)
- IT 207217-27-4

RL: BSU (Biological study, unclassified); BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses) (nucleotide sequence; cloning and expression of nematode **.DELTA.6-desaturase** cDNA and its uses)

L40 ANSWER 7 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1999:147308 HCAPLUS

DN 130:206689

ED Entered STN: 08 Mar 1999

TI .DELTA.11-Acyl-CoA desaturase from **cabbage looper** moth and its use for pheromone synthesis

IN Knipple, Douglas C.; Roelofs, Wendell L.; Miller, Stuart J.

PA Cornell Research Foundation, Inc., USA

SO U.S., 37 pp.

CODEN: USXXAM

DT Patent

LA English

IC ICM C12N009-02

NCL 435189000

CC 7-2 (Enzymes)

Section cross-reference(s): 3, 12

FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|----------------|------|--------------|-----------------|--------------|
| PI | US 5876994 | A | 19990302 | US 1995-558823 | 19951116 <-- |
| PRAI | US 1995-558823 | | 19951116 <-- | | |

AB The present invention is directed to isolated membrane-associated acyl-CoA desaturases expressed in the pheromone gland of an insect and, in particular, the .DELTA.11-desaturase of *Trichoplusia ni*. The present invention further relates to an isolated DNA mol. encoding the T. ni .DELTA.11-desaturase, expression vectors comprising the DNA mol., and host cells comprising the expression vectors. Methods for isolating DNA sequences of homologous acyl-CoA desaturases expressed in the pheromone glands of insects are provided. The use of these acyl-CoA desaturases, DNA mols., expression vectors, and host cells to produce an unsatd. fatty acyl-CoA product from a saturated or unsatd. fatty acyl-CoA reactant is also disclosed. The unsatd. fatty acyl-CoA products are useful as pheromones or as pheromone precursors as well as in the preparation of organic mols., such as drugs.

ST fatty acyl CoA desaturase cDNA sequence *Trichoplusia*

IT Pheromones, animal

RL: BSU (Biological study, unclassified); MFM (Metabolic formation); BIOL (Biological study); FORM (Formation, nonpreparative) (biosynthesis of precursors of; .DELTA.11-acyl-CoA desaturase from cabbage looper moth and its use for pheromone synthesis)

IT *Escherichia coli*

Saccharomyces cerevisiae

(cloning in; .DELTA.11-acyl-CoA desaturase from cabbage looper moth and its use for pheromone synthesis)

IT **cDNA sequences**

(for .DELTA.11-acyl-CoA desaturase from cabbage looper moth)

IT Protein sequences

(of .DELTA.11-acyl-CoA desaturase from cabbage looper moth)

IT **Molecular cloning**

Trichoplusia ni

(.DELTA.11-acyl-CoA desaturase from cabbage looper moth and its use for pheromone synthesis)

IT 220893-87-8P 220893-91-4P

RL: BOC (Biological occurrence); BPN (Biosynthetic preparation); BSU

(Biological study, unclassified); CAT (Catalyst use); PRP (Properties);
BIOL (Biological study); OCCU (Occurrence); PREP (Preparation); USES
(Uses)

(amino acid sequence; .DELTA.11-acyl-CoA desaturase from cabbage looper
moth and its use for pheromone synthesis)

IT 220893-99-2P

RL: BOC (Biological occurrence); BPN (Biosynthetic preparation); BSU
(Biological study, unclassified); CAT (Catalyst use); PRP (Properties);
BIOL (Biological study); OCCU (Occurrence); PREP (Preparation); USES
(Uses)

(nucleotide sequence; .DELTA.11-acyl-CoA desaturase from cabbage looper
moth and its use for pheromone synthesis)

IT 77000-04-5P

RL: BOC (Biological occurrence); BPN (Biosynthetic preparation); BSU
(Biological study, unclassified); CAT (Catalyst use); PRP (Properties);
BIOL (Biological study); OCCU (Occurrence); PREP (Preparation); USES
(Uses)

(.DELTA.11-acyl-CoA desaturase from cabbage looper moth and its use for
pheromone synthesis)

RE.CNT 20 THERE ARE 20 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE

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- (2) Cheneval; Proc Natl Acad Sci USA 1991, V88, P8465 HCAPLUS
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P271
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- (20) Zhao; Arch Insect Biochem Physiol 1990, V15, P57 HCAPLUS

IT 220893-99-2P

RL: BOC (Biological occurrence); BPN (Biosynthetic preparation); BSU
(Biological study, unclassified); CAT (Catalyst use); PRP (Properties);
BIOL (Biological study); OCCU (Occurrence); PREP (Preparation); USES
(Uses)

(nucleotide sequence; .DELTA.11-acyl-CoA desaturase from cabbage looper
moth and its use for pheromone synthesis)

L40 ANSWER 8 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1999:34426 HCAPLUS

DN 130:92118

ED Entered STN: 19 Jan 1999

TI Plant .DELTA.9-14:0-ACP fatty acid desaturase and its cDNA sequence and
use for **improved pest resistance**

IN Craig, Richard; Medford, June I.; Mumma, Ralph O.; Cox-Foster, Diana L.;
Schultz, David

PA The Penn State Research Foundation, USA

SO U.S., 26 pp.
 CODEN: USXXAM
 DT Patent
 LA English
 IC ICM C12N009-02
 ICS C07N021-04
 NCL 435189000
 CC 7-2 (Enzymes)
 Section cross-reference(s): 3, 5, 11
 FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|----------------|------|----------|-----------------|--------------|
| PI | US 5856157 | A | 19990105 | US 1997-869137 | 19970604 <-- |
| PRAI | US 1997-869137 | | 19970604 | <-- | |

AB A novel plant fatty acid desaturase cDNA that encodes a .DELTA.9- 14:0-ACP desaturase (I) from garden geranium (Pelargonium x hortorum) is provided. Several lines of evidence indicate that expression of I leads to the production of the .omega.5-anacardic acids involved in pest resistance in the genus Pelargonium and other plants generally. The desaturase gene is also useful in other contexts and for other purposes such as increasing the percentage of unsatd. fatty acids in oil-producing crops such as soybeans, rapeseed, maize, sunflower, safflower, cotton, cuphea, peanut, coconut and oil-palm, as well as increasing the percentage of unsatd. fatty acids in other plants generally.

ST Pelargonium myristyl ACP desaturase cDNA cloning sequence; geranium omega5 anacardic acid pest resistance

IT **cDNA sequences**
 (for .DELTA.9-14:0-ACP fatty acid desaturase from geranium)

IT Protein sequences
 (of .DELTA.9-14:0-ACP fatty acid desaturase from geranium)

IT Coconut (Cocos nucifera)
 Corn
 Cotton
 Cuphea
 Disease resistance, plant
Genetic engineering
 Oil palm (Elaeis)
 Peanut (Arachis hypogaea)
 Pelargonium hortorum
 Plant (Embryophyta)
 Rape (plant)
 Safflower (Carthamus tinctorius)
 Soybean (Glycine max)
 Sunflower
 (plant .DELTA.9-14:0-ACP fatty acid desaturase and its cDNA sequence and use for improved pest resistance)

IT Organ, plant
 (trichosomes; plant .DELTA.9-14:0-ACP fatty acid desaturase and its cDNA sequence and use for improved pest resistance)

IT Fatty acids, biological studies
 RL: BOC (Biological occurrence); BSU (Biological study, unclassified); MFM (Metabolic formation); BIOL (Biological study); FORM (Formation, nonpreparative); OCCU (Occurrence)
 (unsatd.; plant .DELTA.9-14:0-ACP fatty acid desaturase and its cDNA sequence and use for improved pest resistance)

IT 181142-15-4
 RL: AGR (Agricultural use); BAC (Biological activity or effector, except adverse); BOC (Biological occurrence); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); OCCU (Occurrence); USES (Uses)

(amino acid sequence; plant .DELTA.9-14:0-ACP fatty acid desaturase and its cDNA sequence and use for improved pest resistance)

IT 176454-74-3
 RL: AGR (Agricultural use); BOC (Biological occurrence); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); OCCU (Occurrence); USES (Uses)
 (nucleotide sequence; plant .DELTA.9-14:0-ACP fatty acid desaturase and its cDNA sequence and use for improved pest resistance)

IT 37256-86-3
 RL: AGR (Agricultural use); BAC (Biological activity or effector, except adverse); BOC (Biological occurrence); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); OCCU (Occurrence); USES (Uses)
 (plant .DELTA.9-14:0-ACP fatty acid desaturase and its cDNA sequence and use for improved pest resistance)

IT 112-85-6, Docosanoic acid 506-37-6 557-59-5, Tetracosanoic acid 1002-96-6 11034-77-8, Anacardic acid 133640-27-4
 RL: BOC (Biological occurrence); BSU (Biological study, unclassified); MFM (Metabolic formation); BIOL (Biological study); FORM (Formation, nonpreparative); OCCU (Occurrence)
 (plant .DELTA.9-14:0-ACP fatty acid desaturase and its cDNA sequence and use for improved pest resistance)

RE.CNT 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE
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 (5) Cahoon, E; The Journal of Biological Chemistry 1994, V269(44), P27519 HCAPLUS
 (6) David, J; Proc Natl Acad Sci USA Plant Biology 1996, V93, P8771
 (7) Edgar, B; Plant Molecular Biology 1997, V33, P1105

IT 176454-74-3
 RL: AGR (Agricultural use); BOC (Biological occurrence); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); OCCU (Occurrence); USES (Uses)
 (nucleotide sequence; plant .DELTA.9-14:0-ACP fatty acid desaturase and its cDNA sequence and use for improved pest resistance)

L40 ANSWER 9 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1999:7763 HCAPLUS

DN 130:78795

ED Entered STN: 06 Jan 1999

TI Altering **vegetable oil** composition by mutation in fatty acid desaturase genes

IN Debonte, Lorin R.; Zhegong, Fan; Loh, Willie H. T.; Shorrosh, Basil S.

PA Cargill, Incorporated, USA; Loh, Willie H-T.

SO PCT Int. Appl., 116 pp.
 CODEN: PIXXD2

DT Patent

LA English

IC ICM A01H001-06
 ICS A01H005-10; A01H001-00; C12N015-00; C07C057-03; C07C053-126

CC 11-1 (Plant Biochemistry)
 Section cross-reference(s): 3, 7, 17

FAN.CNT 2

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|--|------|----------|-----------------|--------------|
| WO 9856239 | A1 | 19981217 | WO 1998-US12332 | 19980611 <-- |
| W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, | | | | |

DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG,
 KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX,
 NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT,
 UA, UG, US, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM
 RW: GH, GM, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES,
 FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI,
 CM, GA, GN, ML, MR, NE, SN, TD, TG

AU 9880715 A1 19981230 AU 1998-80715 19980611 <--

AU 750363 B2 20020718

EP 987936 A1 20000329 EP 1998-929058 19980611 <--

R: AT, BE, CH, DE, DK, ES, FR, GB, IT, LI, NL, PT

JP 2002508659 T2 20020319 JP 1999-503298 19980611 <--

MX 9911601 A 20000831 MX 1999-11601 19991213 <--

PRAI US 1997-874109 A 19970612 <--

WO 1998-US12332 W 19980611

AB A method of preparing vegetable oils that are high in oleic acid; low in linoleic acid; and low in (linoleic acid + linolenic acid) by directed of the plant genes for .DELTA.12 and .DELTA.15 desaturase is described. Preferred plants are rapeseed and sunflower plants. The plant carries a mutation in the conserved motif His-Xaa-Xaa-His, found in .DELTA.12- and .DELTA.15-desaturases. The motif usually has the sequence HECGH and this is altered to HKCGH. Lines of Brassica napus producing high-oleic, low-linoleic acid were selected after chemical mutagenesis of seeds. .DELTA.12 Desaturase genes (Fad-2) were cloned by PCR and sequenced to identify the amino acid substitutions. PCR assays for rapid determination of

the

allelotypes of Fad-2 genes were developed using the mutations leading to the desired phenotypes.

ST delta15 desaturase mutation canola fatty acids oil; delta12 desaturase mutation canola fatty acids oil; sunflower oil compn fatty acid desaturase mutation; linoleic acid canola oil fatty acid desaturase mutation; oleic acid canola oil fatty acid desaturase mutation

IT Gene, plant

RL: AGR (Agricultural use); PRP (Properties); BIOL (Biological study);

USES (Uses)

(Fad2, mutation of; altering vegetable oil composition by mutation in fatty acid desaturase genes)

IT Gene, plant

RL: AGR (Agricultural use); PRP (Properties); BIOL (Biological study);

USES (Uses)

(Fad2-D, mutation of; altering vegetable oil composition by mutation in fatty acid desaturase genes)

IT Gene, plant

RL: AGR (Agricultural use); PRP (Properties); BIOL (Biological study);

USES (Uses)

(Fad2-F, mutation of; altering vegetable oil composition by mutation in fatty acid desaturase genes)

IT Gene, plant

RL: AGR (Agricultural use); PRP (Properties); BIOL (Biological study);

USES (Uses)

(Fad2-U, mutation of; altering vegetable oil composition by mutation in fatty acid desaturase genes)

IT Gene, plant

RL: AGR (Agricultural use); PRP (Properties); BIOL (Biological study);

USES (Uses)

(Fad3, for .DELTA.15 desaturase; altering vegetable oil composition by mutation in fatty acid desaturase genes)

IT Brassica napus

Cruciferae (Brassicaceae)

(altering vegetable oil composition by mutation in fatty acid desaturase

- genes)
- IT Rape oil
Sunflower oil
RL: PRP (Properties)
(altering vegetable oil composition by mutation in fatty acid desaturase genes)
- IT Breeding, plant
(for altered vegetable oil fatty acid profiles; altering vegetable oil composition by mutation in fatty acid desaturase genes)
- IT PCR (polymerase chain reaction)
(for determination of allelotypes of Fad-2 genes of Brassica; altering vegetable oil composition by mutation in fatty acid desaturase genes)
- IT **Primers (nucleic acid)**
RL: AGR (Agricultural use); ARG (Analytical reagent use); ANST (Analytical study); BIOL (Biological study); USES (Uses)
(for determination of allelotypes of Fad-2 genes of Brassica; altering vegetable oil composition by mutation in fatty acid desaturase genes)
- IT DNA sequences
(for .DELTA.12 desaturase gene of canola; altering vegetable oil composition by mutation in fatty acid desaturase genes)
- IT **cDNA sequences**
(for .DELTA.12 desaturase genes of canola; altering vegetable oil composition by mutation in fatty acid desaturase genes)
- IT Protein sequences
(of .DELTA.12 desaturases of canola; altering vegetable oil composition by mutation in fatty acid desaturase genes)
- IT Plasmid vectors
(pIMC110, Fad3 gene of Brassica on, effects on vegetable oil composition of; altering vegetable oil composition by mutation in fatty acid desaturase genes)
- IT Plasmid vectors
(pIMC205, mutant allele of Fad3 gene of Brassica on, effects on vegetable oil composition of; altering vegetable oil composition by mutation in fatty acid desaturase genes)
- IT Fats and Glyceridic oils, biological studies
RL: FFD (Food or feed use); PRP (Properties); BIOL (Biological study); USES (Uses)
(vegetable; altering vegetable oil composition by mutation in fatty acid desaturase genes)
- IT 192889-75-1 192889-77-3 192889-79-5 192889-81-9 217797-31-4
217797-37-0 217797-39-2 218439-94-2 218439-99-7 218440-03-0
RL: AGR (Agricultural use); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
(amino acid sequence; altering vegetable oil composition by mutation in fatty acid desaturase genes)
- IT 71427-04-8, .DELTA.15 Desaturase 84628-81-9
RL: AGR (Agricultural use); BIOL (Biological study); USES (Uses)
(directed mutation of; altering vegetable oil composition by mutation in fatty acid desaturase genes)
- IT 192823-54-4
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(in fatty acid desaturases, amino acid substitution of; altering vegetable oil composition by mutation in fatty acid desaturase genes)
- IT 192823-55-5 192823-57-7
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(in inactive fatty acid desaturases; altering vegetable oil composition by mutation in fatty acid desaturase genes)

IT 112-80-1, Oleic acid, biological studies
RL: BOC (Biological occurrence); BSU (Biological study, unclassified); FFD
(Food or feed use); MFM (Metabolic formation); BIOL (Biological study);
FORM (Formation, nonpreparative); OCCU (Occurrence); USES (Uses)
(increasing vegetable oil content of; altering vegetable oil composition by
mutation in fatty acid desaturase genes)

IT 60-33-3, Linoleic acid, biological studies 463-40-1, Linolenic acid
RL: BOC (Biological occurrence); BSU (Biological study, unclassified); FFD
(Food or feed use); MFM (Metabolic formation); BIOL (Biological study);
FORM (Formation, nonpreparative); OCCU (Occurrence); USES (Uses)
(lowering vegetable oil content of; altering vegetable oil composition by
mutation in fatty acid desaturase genes)

IT 192889-78-4 192889-80-8 218439-80-6, DNA (Brassica
napus gene Fad-2 cDNA) 218439-84-0 218439-85-1, DNA (Brassica
napus gene Fad-2D cDNA) 218439-88-4 218439-90-8
218439-93-1 218439-98-6 218440-01-8
RL: AGR (Agricultural use); BSU (Biological study, unclassified); PRP
(Properties); BIOL (Biological study); USES (Uses)
(nucleotide sequence; altering vegetable oil composition by mutation in
fatty acid desaturase genes)

IT 218440-05-2 218440-16-5
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL
(Biological study)
(nucleotide sequence; altering vegetable oil composition by mutation in
fatty acid desaturase genes)

RE.CNT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

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- (3) EI Du Pont De Nemours and Company; WO 94/11516 A1 1994 HCAPLUS
- (4) Robbelen, G; Z Pflanzenzuchtg 1975, V73, P93
- (5) Wong; US 5387753 A 1995 HCAPLUS

IT 192889-78-4 192889-80-8 218439-84-0
218439-88-4 218439-93-1
RL: AGR (Agricultural use); BSU (Biological study, unclassified); PRP
(Properties); BIOL (Biological study); USES (Uses)
(nucleotide sequence; altering vegetable oil composition by mutation in
fatty acid desaturase genes)

L40 ANSWER 10 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1999:3337 HCAPLUS

DN 130:65607

ED Entered STN: 04 Jan 1999

TI Canola oil having increased oleic acid and decreased linolenic acid
content and its manufacture using **transgenic plants**

IN Debonte, Lorin R.; Hitz, William D.

PA Cargill, Incorporated, USA

SO U.S., 18 pp.

CODEN: USXXAM

DT Patent

LA English

IC ICM A01H005-00

ICS C12N005-14; C12N015-29; C12N015-52

NCL 800281000

CC 17-9 (Food and Feed Chemistry)

Section cross-reference(s): 3, 11

FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|----|------------|------|----------|-----------------|--------------|
| PI | US 5850026 | A | 19981215 | US 1996-675650 | 19960703 <-- |

| | | | | | |
|------|----------------|----|----------|----------------|--------------|
| | US 6063947 | A | 20000516 | US 1997-907608 | 19970808 <-- |
| | US 6441278 | B1 | 20020827 | US 2000-482287 | 20000113 <-- |
| | US 6583303 | B1 | 20030624 | US 2001-966888 | 20010928 <-- |
| | US 2004010819 | A1 | 20040115 | US 2003-435521 | 20030508 <-- |
| PRAI | US 1996-675650 | A3 | 19960703 | <-- | |
| | US 1997-907608 | A1 | 19970808 | <-- | |
| | US 2000-482287 | A1 | 20000113 | | |
| | US 2001-966888 | A1 | 20010928 | | |

AB An endogenous oil extracted from Brassica seeds is disclosed that contains, after crushing and extraction, greater than 86% oleic acid and less than 2.5% .alpha.-linolenic acid. The oil also contains less than 7% linoleic acid. The Brassica seeds are produced by plants that contain seed-specific inhibition of microsomal oleate desaturase and microsomal linoleate desaturase gene expression. Such inhibition can be created by cosuppression or antisense technol. Such an oil has a very high oxidative stability in the absence of added antioxidants. Generation of transgenic Brassica with desaturase gene expression inhibited by cosuppression using cytoplasmic desaturase genes under control of seed-specific promoters is demonstrated. Cosuppression was used in combination with classical mutation to generate new lines with altered oil fatty acid profiles.

ST canola oil fatty acid desaturase gene expression; linoleic acid canola oil desaturase gene expression; oleic acid canola oil desaturase gene expression

IT Gene, plant
 RL: AGR (Agricultural use); PRP (Properties); BIOL (Biological study); USES (Uses)
 (Fad2, in altering fatty acid profiles of canol oil; canola oil having increased oleic acid and decreased linolenic acid content and its manufacture using transgenic plants)

IT Gene, plant
 RL: AGR (Agricultural use); PRP (Properties); BIOL (Biological study); USES (Uses)
 (Fad3, in altering fatty acid profiles of canol oil; canola oil having increased oleic acid and decreased linolenic acid content and its manufacture using transgenic plants)

IT Brassica napus
 Breeding, plant
 (canola oil having increased oleic acid and decreased linolenic acid content and its manufacture using transgenic plants)

IT **Antisense DNA**
 RL: AGR (Agricultural use); BIOL (Biological study); USES (Uses)
 (canola oil having increased oleic acid and decreased linolenic acid content and its manufacture using transgenic plants)

IT Canola oil
 RL: PRP (Properties)
 (canola oil having increased oleic acid and decreased linolenic acid content and its manufacture using transgenic plants)

IT Globulins, biological studies
 RL: BSU (Biological study, unclassified); BIOL (Biological study)
 (cruciferins, seed-specific expression of fatty acid desaturase genes from promoter of gene for; canola oil having increased oleic acid and decreased linolenic acid content and its manufacture using transgenic plants)

IT **cDNA sequences**
 (for .DELTA.12 desaturase of Brassica; canola oil having increased oleic acid and decreased linolenic acid content and its manufacture using transgenic plants)

IT Albumins, biological studies
 RL: BSU (Biological study, unclassified); BIOL (Biological study)
 (napins, seed-specific expression of fatty acid desaturase genes from

- promoter of gene for; canola oil having increased oleic acid and decreased linolenic acid content and its manufacture using transgenic plants)
- IT **Genetic engineering**
(of canola oil composition; canola oil having increased oleic acid and decreased linolenic acid content and its manufacture using transgenic plants)
- IT Protein sequences
(of .DELTA.12 desaturase of Brassica; canola oil having increased oleic acid and decreased linolenic acid content and its manufacture using transgenic plants)
- IT Proteins, specific or class
RL: BSU (Biological study, unclassified); BIOL (Biological study)
(oleosins, seed-specific expression of fatty acid desaturase genes from promoter of gene for; canola oil having increased oleic acid and decreased linolenic acid content and its manufacture using transgenic plants)
- IT Plasmid vectors
(pIMC110, .DELTA.15-desaturase gene on, expression in Brassica of; canola oil having increased oleic acid and decreased linolenic acid content and its manufacture using transgenic plants)
- IT Plasmid vectors
(pIMC127, .DELTA.12-desaturase D gene on, expression in Brassica of; canola oil having increased oleic acid and decreased linolenic acid content and its manufacture using transgenic plants)
- IT Plasmid vectors
(pIMC133, .DELTA.12-desaturase D gene on, expression in Brassica of; canola oil having increased oleic acid and decreased linolenic acid content and its manufacture using transgenic plants)
- IT Plasmid vectors
(pIMC135, .DELTA.12-desaturase D gene on, expression in Brassica of; canola oil having increased oleic acid and decreased linolenic acid content and its manufacture using transgenic plants)
- IT Plasmid vectors
(pIMC201, .DELTA.12-desaturase D gene on, expression in Brassica of; canola oil having increased oleic acid and decreased linolenic acid content and its manufacture using transgenic plants)
- IT Globulins, biological studies
RL: BSU (Biological study, unclassified); BIOL (Biological study)
(phaseolins, seed-specific expression of fatty acid desaturase genes from promoter of gene for; canola oil having increased oleic acid and decreased linolenic acid content and its manufacture using transgenic plants)
- IT Gene
(processes, cosuppression, of fatty acid desaturase gene expression; canola oil having increased oleic acid and decreased linolenic acid content and its manufacture using transgenic plants)
- IT Promoter (genetic element)
RL: AGR (Agricultural use); BIOL (Biological study); USES (Uses)
(seed-specific, expression of fatty acid desaturase genes from; canola oil having increased oleic acid and decreased linolenic acid content and its manufacture using transgenic plants)
- IT 217797-31-4 217797-37-0 217797-39-2
RL: AGR (Agricultural use); PRP (Properties); BIOL (Biological study); USES (Uses)
(amino acid sequence; canola oil having increased oleic acid and decreased linolenic acid content and its manufacture using transgenic plants)
- IT 112-80-1, Oleic acid, biological studies
RL: BOC (Biological occurrence); BSU (Biological study, unclassified); FFD

(Food or feed use); BIOL (Biological study); OCCU (Occurrence); USES (Uses)

(canola oil high in; canola oil having increased oleic acid and decreased linolenic acid content and its manufacture using transgenic plants)

IT 60-33-3, Linoleic acid, biological studies

RL: BOC (Biological occurrence); BSU (Biological study, unclassified); FFD (Food or feed use); BIOL (Biological study); OCCU (Occurrence); USES (Uses)

(canola oil low in; canola oil having increased oleic acid and decreased linolenic acid content and its manufacture using transgenic plants)

IT 112-86-7, Erucic acid 463-40-1, .alpha.-Linolenic acid

RL: BOC (Biological occurrence); BSU (Biological study, unclassified); FFD (Food or feed use); BIOL (Biological study); OCCU (Occurrence); USES (Uses)

(in canola oil; canola oil having increased oleic acid and decreased linolenic acid content and its manufacture using transgenic plants)

IT 217797-30-3 217797-33-6 217797-38-1

RL: AGR (Agricultural use); PRP (Properties); BIOL (Biological study); USES (Uses)

(nucleotide sequence; canola oil having increased oleic acid and decreased linolenic acid content and its manufacture using transgenic plants)

IT 9082-66-0, Linoleate desaturase 71427-04-8,

.DELTA.15-Fatty acid desaturase 72536-70-0, Oleate desaturase

84628-81-9, .DELTA.12-Fatty acid desaturase

RL: BSU (Biological study, unclassified); BIOL (Biological study)

(reducing levels in Brassica seed of; canola oil having increased oleic acid and decreased linolenic acid content and its manufacture using transgenic plants)

RE.CNT 36 THERE ARE 36 CITED REFERENCES AVAILABLE FOR THIS RECORD

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- (14) Garg; New England J Med 1988, V319, P829 MEDLINE
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- (26) Robbelen; International Conference on the Science Technology and Marketing of Rapeseed and Rapeseed Products 1970
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- (29) Roy; Z Pflanzenzuchtg 1985, V95, P201 HCAPLUS
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- (31) Scarth; Can J Plant Sci 1988, V68(509), P511
- (32) Scott, G; New England J Med 1986, V314, P745
- (33) Shpota, V; Proceedings of the International Rapeseed Conference 1987, P560
- (34) Spinner; US 4948811 1990 HCAPLUS
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- (36) Yadav; Plant Physiol 1993, V103, P467 HCAPLUS

IT 217797-30-3 217797-33-6 217797-38-1

RL: AGR (Agricultural use); PRP (Properties); BIOL (Biological study); USES (Uses)

(nucleotide sequence; canola oil having increased oleic acid and decreased linolenic acid content and its manufacture using transgenic plants)

IT 9082-66-0, Linoleate desaturase

RL: BSU (Biological study, unclassified); BIOL (Biological study)

(reducing levels in Brassica seed of; canola oil having increased oleic acid and decreased linolenic acid content and its manufacture using transgenic plants)

L40 ANSWER 11 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1998:712363 HCAPLUS

DN 129:326977

ED Entered STN: 10 Nov 1998

TI Fungal fatty acid desaturases and cDNAs, production of unsaturated fatty acids with recombinant organisms, and pharmaceuticals, cosmetics and **nutritional compositions** containing them

IN Knutzon, Deborah; Mukerji, Pradip; Huang, Yung-sheng; Thurmond, Jennifer; Chaudhary, Sunita; Leonard, Amanda Eun-yeong

PA Calgene LLC, USA; Abbott Laboratories

SO PCT Int. Appl., 154 pp.

CODEN: PIXXD2

DT Patent

LA English

IC ICM C12N015-53

ICS C12N015-83; C12N005-10; C12P007-64; C11B001-00; A61K031-20; A23L001-30; A23K001-00

CC 3-3 (Biochemical **Genetics**)

Section cross-reference(s): 1, 7, 10, 17, 62

FAN.CNT 7

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|----|------------|--|----------|-----------------|--------------|
| PI | WO 9846765 | A1 | 19981022 | WO 1998-US7422 | 19980410 <-- |
| | W: | AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM | | | |
| | RW: | GH, GM, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG | | | |
| | US 5972664 | A | 19991026 | US 1997-833610 | 19970411 <-- |
| | AU 9871148 | A1 | 19981111 | AU 1998-71148 | 19980410 <-- |
| | AU 720725 | B2 | 20000608 | | |
| | EP 1007691 | A1 | 20000614 | EP 1998-918175 | 19980410 <-- |
| | R: | AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, | | | |

IE, SI, FI, RO

| | | | | | |
|---------------|----|----------|-----------------|----------|-----|
| TR 9902466 | T2 | 20000721 | TR 1999-9902466 | 19980410 | <-- |
| NZ 337458 | A | 20000728 | NZ 1998-337458 | 19980410 | <-- |
| BR 9809083 | A | 20000801 | BR 1998-9083 | 19980410 | <-- |
| JP 2001523092 | T2 | 20011120 | JP 1998-544176 | 19980410 | <-- |
| US 6432684 | B1 | 20020813 | US 1999-227613 | 19990108 | <-- |
| US 6589767 | B1 | 20030708 | US 1999-377452 | 19990819 | <-- |
| NO 9904924 | A | 19991130 | NO 1999-4924 | 19991008 | <-- |
| MX 9909327 | A | 20000930 | MX 1999-9327 | 19991011 | <-- |
| US 6428990 | B1 | 20020806 | US 1999-439261 | 19991112 | <-- |
| US 2003104596 | A1 | 20030605 | US 2002-191513 | 20020709 | <-- |

PRAI US 1997-833610 A2 19970411 <--
 WO 1998-US7422 W 19980410
 US 1999-227613 A2 19990108

AB The present invention relates to a fatty acid .DELTA.5-desaturase able to catalyze the conversion of dihomo-gamma-linolenic acid to arachidonic acid. Nucleic acid sequences encoding .DELTA.5-desaturase, nucleic acid sequences which hybridize thereto, DNA constructs comprising a .DELTA.5-desaturase gene, and recombinant host microorganism or animal expressing increased levels of a .DELTA.5-desaturase are described. Methods for desaturating a fatty acid at the .DELTA.5 position and for producing arachidonic acid by expressing increased levels of a .DELTA.5-desaturase are disclosed. Fatty acids, and oils containing them, which have been desatd. by a .DELTA.5-desaturase produced by recombinant host microorganisms or animals are provided. Pharmaceutical compns., infant formulas or dietary supplements containing fatty acids which have been desatd. by a .DELTA.5-desaturase produced by a recombinant host microorganism or animal also are described. The cDNA for Mortierella .DELTA.5-desaturase was cloned and sequenced. This cDNA was expressed in baker's yeast and the composition of the lipid fraction was determined CDNAs for .DELTA.5-desaturase homologs in other organisms were cloned.

ST sequence Mortierella fatty acid desaturase cDNA; unsatd fatty acid recombinant organism diet

IT Bird (Aves)
 Insect (Insecta)
 (cell, recombinant; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)

IT Dictyostelium discoideum
 Phaeodactylum tricornutum
 Schizochytrium
 (fatty acid desaturase of; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)

IT Cosmetics
 Feed
 Fungi
 Mortierella
 Mortierella alpina
 (fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)

IT Fats and Glyceridic oils, biological studies
 RL: BPN (Biosynthetic preparation); FFD (Food or feed use); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
 (fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)

- IT **cDNA sequences**
(for fatty acid desaturases of fungi and human)
- IT Milk substitutes
(human; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT Animal cell
(mammalian, recombinant; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT Protein sequences
(of fatty acid desaturases of fungi and human)
- IT Algae
Eukaryote (Eukaryotae)
Plant cell
Saccharomyces cerevisiae
Yeast
(recombinant; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT Diet
(supplements/substitutes; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT Marine algae
(transgenic; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT 214971-48-9
RL: BPR (Biological process); BSU (Biological study, unclassified); BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); PROC (Process); USES (Uses)
(amino acid sequence; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT 214970-62-4 214970-63-5 214970-64-6 214970-65-7 214970-66-8
214970-67-9 214970-68-0
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(amino acid sequence; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT 214970-50-0 214970-52-2 214970-54-4 215027-06-8
RL: BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
(amino acid sequence; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT 10417-94-4P, Eicosapentaenoic acid
RL: BPN (Biosynthetic preparation); BIOL (Biological study); PREP (Preparation)
(fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT 1783-84-2P, Dihomo-.gamma.-linolenic acid
RL: BPN (Biosynthetic preparation); BPR (Biological process); BSU (Biological study, unclassified); FFD (Food or feed use); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); PROC (Process); USES (Uses)
(fatty acid desaturases and cDNAs, their use for preparation of unsatd.

- fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT 506-32-1P, Arachidonic acid
RL: BPN (Biosynthetic preparation); FFD (Food or feed use); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
(fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT 9014-34-0, Fatty acid desaturase 51901-23-6, .DELTA.5-Desaturase
RL: BPR (Biological process); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); PROC (Process)
(fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT 214970-55-5 214970-56-6 214970-57-7
214970-58-8 214970-59-9 214970-60-2
214970-61-3
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(nucleotide sequence; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT 194744-91-7 214970-51-1 214970-53-3
214971-47-8 215027-05-7
RL: BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
(nucleotide sequence; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- RE.CNT 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE
- (1) Covello, P; PLANT PHYSIOLOGY 1996, V111(1), P223 HCAPLUS
(2) Kishore, G; WO 9418337 A 1994 HCAPLUS
(3) Lubrizol Corp; EP 0561569 A 1993 HCAPLUS
(4) Michaelson, L; JOURNAL OF BIOLOGICAL CHEMISTRY 1998, V273(30), P19055 HCAPLUS
(5) Rhone Poulenc Agrochimie; WO 9306712 A 1993 HCAPLUS
(6) Rhone Poulenc Agrochimie; WO 9621022 A 1996 HCAPLUS
(7) Spychalla, J; PNAS, U S A 1997, V94(4), P1142 HCAPLUS
- IT 214970-55-5 214970-56-6 214970-57-7
214970-58-8 214970-59-9 214970-60-2
214970-61-3
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(nucleotide sequence; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT 194744-91-7 214970-51-1 214970-53-3
214971-47-8 215027-05-7
RL: BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
(nucleotide sequence; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)

L40 ANSWER 12 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1998:712362 HCAPLUS
DN 129:326976
ED Entered STN: 10 Nov 1998

TI Fungal fatty acid desaturases and cDNAs, transgenic plants expressing these cDNAs, and use of plant products for pharmaceuticals, cosmetics and **nutritional compositions**

IN Knutzon, Deborah; Mukerji, Pradip; Huang, Yung-sheng; Thurmond, Jennifer; Chaudhary, Sunita; Leonard, Amanda Eun-yeong

PA Calgene LLC, USA; Abbott Laboratories

SO PCT Int. Appl., 210 pp.
CODEN: PIXXD2

DT Patent

LA English

IC ICM C12N015-53
ICS C12N015-82; C12N005-10; C12P007-64; C11B001-00; A61K031-20; A23L001-30; A23K001-00

CC 3-3 (Biochemical **Genetics**)
Section cross-reference(s): 1, 7, 10, 11, 17, 62

FAN.CNT 7

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|----------------|--|----------|-----------------|--------------|
| PI | WO 9846764 | A1 | 19981022 | WO 1998-US7421 | 19980410 <-- |
| | W: | AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, US, US, US, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM | | | |
| | RW: | GH, GM, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG | | | |
| | US 5968809 | A | 19991019 | US 1997-834655 | 19970411 <-- |
| | US 5972664 | A | 19991026 | US 1997-833610 | 19970411 <-- |
| | US 6075183 | A | 20000613 | US 1997-834033 | 19970411 <-- |
| | US 6051754 | A | 20000418 | US 1997-956985 | 19971024 <-- |
| | AU 9871147 | A1 | 19981111 | AU 1998-71147 | 19980410 <-- |
| | AU 720677 | B2 | 20000608 | | |
| | EP 996732 | A1 | 20000503 | EP 1998-918174 | 19980410 <-- |
| | R: | AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, FI, RO | | | |
| | BR 9808506 | A | 20000523 | BR 1998-8506 | 19980410 <-- |
| | NZ 337459 | A | 20000728 | NZ 1998-337459 | 19980410 <-- |
| | JP 2001527395 | T2 | 20011225 | JP 1998-544175 | 19980410 <-- |
| | NO 9904926 | A | 19991130 | NO 1999-4926 | 19991008 <-- |
| | MX 9909328 | A | 20000930 | MX 1999-9328 | 19991011 <-- |
| PRAI | US 1997-833610 | A2 | 19970411 | <-- | |
| | US 1997-834033 | A2 | 19970411 | <-- | |
| | US 1997-834655 | A2 | 19970411 | <-- | |
| | US 1997-956985 | A2 | 19971024 | <-- | |
| | WO 1998-US7421 | W | 19980410 | | |

AB The present invention relates to compns. and methods for preparing polyunsatd. long chain fatty acids in plants, plant parts and plant cells, such as leaves, roots, fruits and seeds. Nucleic acid sequences and constructs encoding fatty acid desaturases, including .DELTA.5-desaturases, .DELTA.6-desaturases and .DELTA.12-desaturases, are used to generate transgenic plants, plant parts and cells which contain and express one or more transgenes encoding one or more desaturases. Expression of the desaturases with different substrate specificities in the plant system permit the large scale production of polyunsatd. long chain fatty acids such as docosahexaenoic acid, eicosapentaenoic acid, .alpha.-linolenic acid, gamma-linolenic acid, arachidonic acid and the like for modification of the fatty acid profile of plants, plant parts and tissues. Manipulation of the fatty acid profiles allows for the production of

- com. quantities of novel plant oils and products. The cDNAs for *Mortierella alpina* .DELTA.5-, .DELTA.6- and .DELTA.12-fatty acid desaturases were cloned and sequenced. Transgenic *Brassica napus* expressing all three of these cDNAs were created and the fatty acid composition of the extracted oil was determined
- ST sequence *Mortierella* fatty acid desaturase cDNA; unsatd fatty acid transgenic plant desaturase
- IT *Schizochytrium*
(fatty acid desaturase of; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT Cosmetics
Feed
Fungi
Mortierella
Mortierella alpina
(fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT Fats and Glyceridic oils, biological studies
RL: BPN (Biosynthetic preparation); FFD (Food or feed use); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
(fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT **cDNA sequences**
(for fatty acid desaturases of fungi and human)
- IT Milk substitutes
(human; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT Protein sequences
(of fatty acid desaturases of fungi and human)
- IT Plant cell
(recombinant; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT Diet
(supplements/substitutes; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT *Brassica*
Brassica napus
Corn
Flax
Plant (Embryophyta)
Safflower (*Carthamus tinctorius*)
Soybean (*Glycine max*)
Sunflower
(transgenic; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT 214970-47-5 214970-49-7
RL: BPR (Biological process); BSU (Biological study, unclassified); BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); PROC (Process); USES (Uses)
(amino acid sequence; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)

- IT 214970-62-4 214970-63-5 214970-64-6 214970-65-7 214970-66-8
214970-67-9 214970-68-0
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(amino acid sequence; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT 214971-48-9 215027-06-8
RL: BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
(amino acid sequence; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT 60-33-3P, 9,12-Octadecadienoic acid (9Z,12Z)-, biological studies
506-26-3P 506-32-1P, Arachidonic acid 1783-84-2P, Dihomo-.gamma.-linolenic acid 10417-94-4P, Eicosapentaenoic acid 20290-75-9P, Stearidonic acid
RL: BPN (Biosynthetic preparation); FFD (Food or feed use); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
(fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT 9082-66-0 51901-23-6, .DELTA.5-Desaturase 72536-70-0
RL: BPR (Biological process); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); PROC (Process)
(fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT 214970-55-5 214970-56-6 214970-57-7
214970-58-8 214970-59-9 214970-60-2
214970-61-3
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(nucleotide sequence; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT 214970-46-4 214970-48-6 214971-47-8
215027-05-7
RL: BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
(nucleotide sequence; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- RE.CNT 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD
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(2) Covello, P; PLANT PHYSIOLOGY 1996, V111(1), P223 HCAPLUS
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(4) Kishore, G; WO 9418337 A 1994 HCAPLUS
(5) Lubrizol Corp; EP 0561569 A 1993 HCAPLUS
(6) Rhone Poulenc Agrochimie; WO 9306712 A 1993 HCAPLUS
(7) Rhone Poulenc Agrochimie; WO 9621022 A 1996 HCAPLUS
- IT 9082-66-0
RL: BPR (Biological process); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); PROC (Process)
(fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT 214970-55-5 214970-56-6 214970-57-7

214970-58-8 214970-59-9 214970-60-2

214970-61-3

RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)

(nucleotide sequence; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)

IT 214970-46-4 214970-48-6 214971-47-8

215027-05-7

RL: BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)

(nucleotide sequence; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)

L40 ANSWER 13 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1998:712361 HCAPLUS

DN 129:326975

ED Entered STN: 10 Nov 1998

TI Fatty acid desaturases and cDNAs, their use for preparation of unsaturated fatty acids, and cosmetic, pharmaceutical and **nutritional compositions** containing them

IN Knutzon, Deborah; Mukerji, Pradip; Huang, Yung-sheng; Thurmond, Jennifer; Chaudhary, Sunita; Leonard, Amanda Eun-yeong

PA Calgene LLC, USA; Abbott Laboratories

SO PCT Int. Appl., 166 pp.

CODEN: PIXXD2

DT Patent

LA English

IC ICM C12N015-53

ICS C12N015-81; C12N009-02; C12N005-10; C12N001-19; C12P007-64; C11B001-00; A61K031-20; A23L001-30

CC 3-3 (Biochemical **Genetics**)

Section cross-reference(s): 1, 7, 10, 16, 17, 62

FAN.CNT 7

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---|------|----------|-----------------|--------------|
| WO 9846763 | A1 | 19981022 | WO 1998-US7126 | 19980410 <-- |
| W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM | | | | |
| RW: GH, GM, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG | | | | |
| US 5968809 | A | 19991019 | US 1997-834655 | 19970411 <-- |
| AU 9869616 | A1 | 19981111 | AU 1998-69616 | 19980410 <-- |
| AU 726807 | B2 | 20001123 | | |
| TR 9902465 | T2 | 20000121 | TR 1999-9902465 | 19980410 <-- |
| EP 975766 | A1 | 20000202 | EP 1998-915430 | 19980410 <-- |
| R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, FI | | | | |
| BR 9808507 | A | 20000523 | BR 1998-8507 | 19980410 <-- |
| NZ 337457 | A | 20000728 | NZ 1998-337457 | 19980410 <-- |
| JP 2001523091 | T2 | 20011120 | JP 1998-544053 | 19980410 <-- |
| US 6136574 | A | 20001024 | US 1999-363574 | 19990729 <-- |
| US 6410288 | B1 | 20020625 | US 1999-363526 | 19990729 <-- |
| NO 9904925 | A | 19991130 | NO 1999-4925 | 19991008 <-- |
| MX 9909329 | A | 20000930 | MX 1999-9329 | 19991011 <-- |

PRAI US 1997-834655 A2 19970411 <--
 WO 1998-US7126 W 19980410

AB The present invention relates to fatty acid desaturases able to catalyze the conversion of oleic acid to linoleic acid, linoleic acid to .gamma.-linolenic acid, or of alpha-linolenic acid to stearidonic acid. Nucleic acid sequences encoding desaturases, nucleic acid sequences which hybridize thereto, DNA constructs comprising a desaturase gene, and recombinant host microorganism or animal expressing increased levels of a desaturase are described. Methods for desaturating a fatty acid and for producing a desatd. fatty acid by expressing increased levels of a desaturase are disclosed. Fatty acids, and oils containing them, which have been desatd. by a desaturase produced by recombinant host microorganisms or animals are provided. Pharmaceutical compns., infant formulas or dietary supplements containing fatty acids which have been desatd. by a desaturase produced by a recombinant host microorganism or animal also are described. The cDNAs for *Mortierella alpina* .DELTA.6- and .DELTA.12-fatty acid desaturases were cloned and sequenced. CDNAs for homologous fatty acid desaturases were cloned from *Dictyostelium discoideum*, *Phaeodactylum tricornutum*, and *Schizochytrium*.

ST sequence *Mortierella* fatty acid desaturase cDNA; unsatd fatty acid infant formula; dietary supplement unsatd fatty acid

IT Bird (Aves)
 Insect (Insecta)
 (cell, recombinant; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)

IT *Dictyostelium discoideum*
Phaeodactylum tricornutum
Schizochytrium
 (fatty acid desaturase of; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)

IT Cosmetics
 Feed
 Fungi
Mortierella
Mortierella alpina
 (fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)

IT **cDNA sequences**
 (for fatty acid desaturases of fungi and human)

IT Milk substitutes
 (human; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)

IT Animal cell
 (mammalian, recombinant; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)

IT Protein sequences
 (of fatty acid desaturases of fungi and human)

IT Algae
 Eukaryote (Eukaryotae)
 Plant cell
Saccharomyces cerevisiae
 Yeast
 (recombinant; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)

- IT Diet
(supplements/substitutes; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT Plant (Embryophyta)
(transgenic; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT 214970-47-5 214970-49-7
RL: BPR (Biological process); BSU (Biological study, unclassified); BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); PROC (Process); USES (Uses)
(amino acid sequence; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT 214970-62-4 214970-63-5 214970-64-6 214970-65-7 214970-66-8
214970-67-9 214970-68-0
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(amino acid sequence; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT 214970-50-0 214970-52-2 214970-54-4 215027-06-8
RL: BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
(amino acid sequence; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT 60-33-3P, 9,12-Octadecadienoic acid (9Z,12Z)-, preparation 506-26-3P, .gamma.-Linolenic acid 20290-75-9P, Stearidonic acid
RL: BPN (Biosynthetic preparation); BIOL (Biological study); PREP (Preparation)
(fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT 463-40-1P, .alpha.-Linolenic acid
RL: BPN (Biosynthetic preparation); BPR (Biological process); BSU (Biological study, unclassified); BIOL (Biological study); PREP (Preparation); PROC (Process)
(fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT 112-80-1, 9-Octadecenoic acid (9Z)-, biological studies
RL: BPR (Biological process); BSU (Biological study, unclassified); BIOL (Biological study); PROC (Process)
(fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT 9082-66-0, ..delta..6-Desaturase 72536-70-0
RL: BPR (Biological process); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); PROC (Process)
(fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)
- IT 214970-55-5 214970-56-6 214970-57-7
214970-58-8 214970-59-9 214970-60-2
214970-61-3
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)

(nucleotide sequence; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)

IT 194744-91-7 214970-46-4 214970-48-6
214970-51-1 214970-53-3 215027-05-7

RL: BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)

(nucleotide sequence; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)

RE.CNT 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD

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- (6) Rhone Poulenc Agrochimie; WO 9306712 A 1993 HCAPLUS
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IT 9082-66-0, ..delta..6-Desaturase

RL: BPR (Biological process); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); PROC (Process)

(fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)

IT 214970-55-5 214970-56-6 214970-57-7
214970-58-8 214970-59-9 214970-60-2
214970-61-3

RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)

(nucleotide sequence; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)

IT 194744-91-7 214970-46-4 214970-48-6
214970-51-1 214970-53-3 215027-05-7

RL: BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)

(nucleotide sequence; fatty acid desaturases and cDNAs, their use for preparation of unsatd. fatty acids, and cosmetic, pharmaceutical and nutritional compns. containing them)

L40 ANSWER 14 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1998:608715 HCAPLUS

DN 129:213516

ED Entered STN: 25 Sep 1998

TI Cloning and expression of cDNA for .DELTA.9-desaturase from
Mortierella

IN Shimizu, Sakayu; Kobayashi, Michihiko

PA Suntory Ltd., Japan

SO PCT Int. Appl., 50 pp.

CODEN: PIXXD2

DT Patent

LA Japanese

IC ICM C12N015-52

ICS C12N015-63; C12N015-80; C12N001-15

CC 7-2 (Enzymes)

Section cross-reference(s): 3, 10, 18

FAN.CNT 1

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------------|------|-------|-----------------|-------|
| ----- | ---- | ----- | ----- | ----- |

PI WO 9838314 A1 19980903 WO 1998-JP819 19980227 <--
W: CA, JP, US
RW: AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE
EP 978563 A1 20000209 EP 1998-905692 19980227 <--
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,
IE, FI
US 6448055 B1 20020910 US 1999-380262 19990827 <--
PRAI JP 1997-44303 A 19970227 <--
WO 1998-JP819 W 19980227

AB The gene and the cDNA encoding .DELTA.9-desaturase are isolated from
Mortierella s. p. mortierella such as Mortierella alpina strain IS-4. The
deduced 446-amino acid sequence exhibits 44.5% similarity to the 402-amino
acid .DELTA.9-desaturase of Saccharomyces cerevisiae. Expression of the
cDNA in transgenic filamentous fungi such as Aspergillus oryzae is also
shown. The gene improves the biosynthesis of palmitoleic acid and oleic
acid in the unsatd. fatty acids-producing cells, which results in improved
productivity of unsatd. fatty acids. By the combination of
.DELTA.9-desaturase with a cytochrome b5 gene or a cytochrome b5 reductase
gene, both are a constituent of a microsomal electron transport system,
production of unsatd. fatty acids can be further enhanced.

ST Mortierella cDNA gene sequence delta desaturase; unsatd fatty acid manuf
desaturase

IT **Molecular cloning**
Mortierella
Mortierella alpina
(cloning and expression of cDNA for .DELTA.9-desaturase from
Mortierella)

IT Gene, microbial
RL: BOC (Biological occurrence); BSU (Biological study, unclassified); BUU
(Biological use, unclassified); PRP (Properties); BIOL (Biological study);
OCCU (Occurrence); USES (Uses)
(cloning and expression of cDNA for .DELTA.9-desaturase from
Mortierella)

IT **cDNA sequences**
(of cDNA for .DELTA.9-desaturase of Mortierella alpina)

IT DNA sequences
(of gene for .DELTA.9-desaturase of Mortierella alpina)

IT Protein sequences
(of .DELTA.9-desaturase of Mortierella alpina)

IT Aspergillus oryzae
Filamentous fungi
(transgenic host; of gene for .DELTA.9-desaturase of Mortierella
alpina)

IT Fatty acids, preparation
RL: BPN (Biosynthetic preparation); BIOL (Biological study); PREP
(Preparation)
(unsatd.; cloning and expression of cDNA for .DELTA.9-desaturase from
Mortierella)

IT 212249-99-5P
RL: BPN (Biosynthetic preparation); BUU (Biological use, unclassified);
CAT (Catalyst use); PRP (Properties); BIOL (Biological study); PREP
(Preparation); USES (Uses)
(amino acid sequence; cloning and expression of cDNA for
.DELTA.9-desaturase from Mortierella)

IT 9014-34-0P
RL: BPN (Biosynthetic preparation); BUU (Biological use, unclassified);
CAT (Catalyst use); PRP (Properties); BIOL (Biological study); PREP
(Preparation); USES (Uses)
(cloning and expression of cDNA for .DELTA.9-desaturase from
Mortierella)

IT 212250-03-8 212250-06-1

RL: BOC (Biological occurrence); BSU (Biological study, unclassified); BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); OCCU (Occurrence); USES (Uses)
(nucleotide sequence; cloning and expression of cDNA for .DELTA.9-desaturase from Mortierella)

RE.CNT 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD

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IT 212250-03-8 212250-06-1

RL: BOC (Biological occurrence); BSU (Biological study, unclassified); BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); OCCU (Occurrence); USES (Uses)
(nucleotide sequence; cloning and expression of cDNA for .DELTA.9-desaturase from Mortierella)

L40 ANSWER 15 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1998:61353 HCAPLUS

DN 128:214937

ED Entered STN: 02 Feb 1998

TI Cloning of a gene for chloroplast .omega.6 desaturase of a green alga, Chlamydomonas reinhardtii

AU Sato, Norihiro; Fujiwara, Shoko; Kawaguchi, Akihiko; Tsuzuki, Mikio

CS School of Life Science, Tokyo University of Pharmacy and Life Science, Tokyo, 192-03, Japan

SO Journal of Biochemistry (Tokyo) (1997), 122(6), 1224-1232

CODEN: JOBIAO; ISSN: 0021-924X

PB Japanese Biochemical Society

DT Journal

LA English

CC 7-5 (Enzymes)

Section cross-reference(s): 3, 10, 11

AB A gene for chloroplast .omega.6 desaturase, which catalyzes the desatn. of monoenoic to dienoic acids in chloroplasts, was isolated from Chlamydomonas reinhardtii. Reverse transcriptase-polymerase chain reaction was first performed with oligonucleotide primers corresponding to regions conserved among plastid .omega.6 desaturases of higher plants and .DELTA.12 desaturases of cyanobacteria, using C. reinhardtii poly(A)+ RNA. An amplified DNA fragment of 0.5 kb, containing a frame for a protein homologous to these desaturases, was used as a probe for screening cDNA and genomic DNA libraries of C. reinhardtii. The cDNA clone of 2.2 kb obtained contained an open reading frame encoding a protein of 424 amino acids with a putative mol. mass of 48.4 kDa, the amino acid sequence of which showed 46-51% homol. to those of higher plant plastid .omega.6 and cyanobacterial .DELTA.12 desaturases. Introduction of the cloned genomic counterpart of this cDNA, designated as des6, into a Chlamydomonas mutant with defects in chloroplast .omega.6 desatn. and in the activities of photosystems I and II (PSI and PSII) complemented the desatn. mutation, indicating that the des6 gene codes for chloroplast .omega.6 desaturase. The complemented strains did not recover from the photosynthetic lesions, but showed lower PSII activity at 45.degree. than the desatn. mutant, proving that the photosynthetic lesions in hf-9 are not caused by the desatn. mutation, and that the lowered unsatn. level of chloroplast lipids in the mutant is responsible for the expression at this high temperature of

PSII

activity, one of the thylakoid membrane functions.

ST cDNA sequence Chlamydomonas gene des6 desaturase; omega6 desaturase
sequence Chlamydomonas gene des6

IT Protein sequences
(alignment; cloning and sequence of gene des6 for chloroplast .omega.6
desaturase of a green alga, Chlamydomonas reinhardtii)

IT Chlamydomonas reinhardtii
Chloroplast
Photosystem I
Photosystem II
Protein motifs

cDNA sequences
(cloning and sequence of gene des6 for chloroplast .omega.6 desaturase
of a green alga, Chlamydomonas reinhardtii)

IT Gene, microbial
RL: BOC (Biological occurrence); BSU (Biological study, unclassified); PRP
(Properties); BIOL (Biological study); OCCU (Occurrence)
(des6; cloning and sequence of gene des6 for chloroplast .omega.6
desaturase of a green alga, Chlamydomonas reinhardtii)

IT Evolution
(mol.; cloning and sequence of gene des6 for chloroplast .omega.6
desaturase of a green alga, Chlamydomonas reinhardtii)

IT Lipids, biological studies
RL: BOC (Biological occurrence); BSU (Biological study, unclassified);
BIOL (Biological study); OCCU (Occurrence)
(unsatd.; cloning and sequence of gene des6 for chloroplast .omega.6
desaturase of a green alga, Chlamydomonas reinhardtii)

IT 204279-00-5
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL
(Biological study)
(amino acid sequence; cloning and sequence of gene des6 for chloroplast
.omega.6 desaturase of a green alga, Chlamydomonas reinhardtii)

IT 66829-01-4
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL
(Biological study)
(gene des6; cloning and sequence of gene des6 for chloroplast .omega.6
desaturase of a green alga, Chlamydomonas reinhardtii)

IT **201260-79-9**, GenBank AB007640
RL: BOC (Biological occurrence); BSU (Biological study, unclassified); PRP
(Properties); BIOL (Biological study); OCCU (Occurrence)
(nucleotide sequence; cloning and sequence of gene des6 for chloroplast
.omega.6 desaturase of a green alga, Chlamydomonas reinhardtii)

RE.CNT 36 THERE ARE 36 CITED REFERENCES AVAILABLE FOR THIS RECORD

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IT 201260-79-9, GenBank AB007640

RL: BOC (Biological occurrence); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); OCCU (Occurrence)
(nucleotide sequence; cloning and sequence of gene des6 for chloroplast .omega.6 desaturase of a green alga, Chlamydomonas reinhardtii)

L40 ANSWER 16 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1997:723666 HCAPLUS

DN 128:33036

ED Entered STN: 17 Nov 1997

TI **Gene expression** changes associated with chemically induced rat mammary carcinogenesis

AU Lu, Junxuan; Pei, Hongying; Kaeck, Mark; Thompson, Henry J.

CS AMC Cancer Research Center for Cancer Causation and Prevention, Denver, CO, 80214, USA

SO Molecular Carcinogenesis (1997), 20(2), 204-215

CODEN: MOCAE8; ISSN: 0899-1987

PB Wiley-Liss

DT Journal

LA English

CC 14-1 (Mammalian Pathological Biochemistry)

Section cross-reference(s): 3, 4

AB Exptl. induced models of breast carcinogenesis in the rat are widely used for studying the biol. of breast cancer and for developing and evaluating cancer prevention and control strategies. However, very little is known about gene expression changes that are associated with exptl. induced mammary carcinogenesis. This paper reports the identification, by differential display of mRNA and mol. cloning, of seven cDNA fragments of gene transcripts overexpressed in mammary carcinomas induced by 1-methyl-1-nitrosourea. These genes included the rat homologs of human galectin-7 gene, the human/mouse melanoma inhibitory activity/bovine chondrocyte-derived retinoic acid sensitive protein gene, the mouse stearyl-CoA desaturase-2 gene, and the mouse endo B cytokeratin/human cytokeratin-18 gene. Although each of these genes has been implicated in some aspect of carcinogenesis in other organs, this paper is the first report of their overexpression in chemical induced mammary carcinomas. Two previously uncharacterized gene transcripts were also identified. A comparison of the expression levels of several genes in mammary carcinomas with those in the normal mammary gland tissue of virgin rats, mid-stage pregnant rats, and of day 1 postpartum lactating dams indicated that the

overexpression of several genes observed in mammary carcinomas could not be accounted for by either a difference in the mammary epithelial content between mammary carcinoma and normal mammary tissue or by mammary epithelium-specific proliferation associated with pregnancy. Several genes were also overexpressed in rat mammary carcinomas induced by 7,12-dimethylbenz[a]anthracene but not in azoxymethane-induced rat colon adenocarcinomas. The genes identified in this study may therefore represent mammary carcinoma-specific mol. markers that may be helpful in investigations of mammary carcinogenesis and its prevention.

- ST gene expression methylnitrosourea mammary carcinogenesis rat
 IT Keratins
 RL: BPR (Biological process); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); PROC (Process)
 (18; gene expression changes associated with chemical induced rat mammary carcinogenesis)
- IT Proteins, specific or class
 RL: PRP (Properties)
 (CD-RAP (cartilage-derived retinoic acid-sensitive protein); gene expression changes associated with chemical induced rat mammary carcinogenesis)
- IT Gene, animal
 RL: PRP (Properties)
 (MIA/CD-RAP; gene expression changes associated with chemical induced rat mammary carcinogenesis)
- IT Mammary gland
 (carcinoma; gene expression changes associated with chemical induced rat mammary carcinogenesis)
- IT Gene, animal
 RL: BPR (Biological process); BSU (Biological study, unclassified); BIOL (Biological study); PROC (Process)
 (expression changes associated with chemical induced rat mammary carcinogenesis)
- IT Gene
 (expression; gene expression changes associated with chemical induced rat mammary carcinogenesis)
- IT **cDNA sequences**
 (for proteins expressed in response to chemical induced rat mammary carcinogenesis)
- IT Agglutinins and Lectins
 RL: PRP (Properties)
 (galactose-binding, galectin-7; gene expression changes associated with chemical induced rat mammary carcinogenesis)
- IT Carcinogens
 Disease models
 Rat (*Rattus norvegicus*)
 Tumor markers
 (gene expression changes associated with chemical induced rat mammary carcinogenesis)
- IT EST (expressed sequence tag)
 RL: PRP (Properties)
 (gene expression changes associated with chemical induced rat mammary carcinogenesis)
- IT Protein sequences
 (of proteins expressed in response to chemical induced rat mammary carcinogenesis)
- IT 9014-34-0
 RL: BPR (Biological process); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); PROC (Process)
 (2; gene expression changes associated with chemical induced rat mammary carcinogenesis)

- IT 199686-74-3, Galectin-7 (*Rattus norvegicus* clone 3) 199686-75-4
 RL: PRP (Properties)
 (amino acid sequence; gene expression changes associated with chemical induced rat mammary carcinogenesis)
- IT 57-97-6, 7,12-Dimethylbenz[*a*]anthracene 684-93-5, 1-Methyl-1-nitrosourea
 RL: ADV (Adverse effect, including toxicity); BIOL (Biological study)
 (gene expression changes associated with chemical induced rat mammary carcinogenesis)
- IT 184860-67-1, GenBank U67990 184860-68-2, GenBank U67991 184860-69-3,
 GenBank U67992 **184860-72-8**, GenBank U67995 185241-44-5,
 GenBank U67883 185241-45-6, GenBank U67884
 RL: PRP (Properties)
 (nucleotide sequence; gene expression changes associated with chemical induced rat mammary carcinogenesis)

RE.CNT 61 THERE ARE 61 CITED REFERENCES AVAILABLE FOR THIS RECORD
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 IT **184860-72-8**, GenBank U67995
 RL: PRP (Properties)
 (nucleotide sequence; gene expression changes associated with chemical induced rat mammary carcinogenesis)
- L40 ANSWER 17 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN
 AN **1997:628484** HCAPLUS
 DN **127:316834**
 ED Entered STN: 02 Oct 1997
 TI Rapid and transient induction of a **parsley microsomal**
 .DELTA.12 fatty acid desaturase mRNA by fungal elicitor
 AU Kirsch, Christoph; Hahlbrock, Klaus; Somssich, Imre E.
 CS Max-Planck-Institut fur Zuchtforschung, Abteilung Biochemie, Cologne,
 D-50829, Germany
 SO Plant Physiology (1997), 115(1), 283-289
 CODEN: PLPHAY; ISSN: 0032-0889
 PB American Society of Plant Physiologists
 DT Journal
 LA English
 CC 11-2 (Plant Biochemistry)
 Section cross-reference(s): 3, 7
 AB Treatment of cultured parsley (*Petroselinum crispum*) cells with a structurally defined peptide elicitor (Pep25) of fungal origin has previously been shown to cause rapid and large changes in the levels of various desatd. fatty acids. Two distinct parsley cDNAs were isolated sharing high sequence similarity with microsomal .omega.-6 fatty acid desaturases (FADs). One of them was functionally identified as a .DELTA.12 FAD by expression in the yeast *Saccharomyces cerevisiae*. Two dienoic fatty acids, hexadecadienoic and linoleic, which were not detectable in control cells, together constituted up to 12% of the total fatty acids in the transformed yeast cells. .DELTA.12 FAD mRNA accumulated rapidly and transiently in elicitor-treated parsley cells, protoplasts, and leaves. These and previous results indicate that fatty acid desatn. is an important early component of the complex defense response of parsley to attempted fungal infection.
 ST parsley fatty acid desaturase fungal elicitor; infection fungi parsley fatty acid desaturase; Pep25 elicitor fatty acid desaturase parsley
 IT **cDNA sequences**
 (for parsley microsomal .DELTA.12 fatty acid desaturase responsive to fungal elicitor)
 IT Protein sequences

- (of parsley microsomal .DELTA.12 fatty acid desaturase responsive to fungal elicitor)
- IT Hormones, microbial
RL: BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); BIOL (Biological study)
(phytoalexin-eliciting, Pep25; rapid and transient induction of a parsley microsomal .DELTA.12 fatty acid desaturase mRNA by fungal elicitor)
- IT Parsley (*Petroselinum crispum*)
(rapid and transient induction of a parsley microsomal .DELTA.12 fatty acid desaturase mRNA by fungal elicitor)
- IT 197594-14-2 197594-15-3
RL: BPR (Biological process); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); PROC (Process)
(amino acid sequence; rapid and transient induction of a parsley microsomal .DELTA.12 fatty acid desaturase mRNA by fungal elicitor)
- IT 185442-90-4, GenBank U75745 197698-97-8
RL: BPR (Biological process); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); PROC (Process)
(nucleotide sequence; rapid and transient induction of a parsley microsomal .DELTA.12 fatty acid desaturase mRNA by fungal elicitor)
- IT 84628-81-9, Fatty acid .DELTA.12-desaturase
RL: BPR (Biological process); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); PROC (Process)
(rapid and transient induction of a parsley microsomal .DELTA.12 fatty acid desaturase mRNA by fungal elicitor)
- IT 67880-95-9, Fatty acid .omega.-3 desaturase
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(rapid and transient induction of a parsley microsomal .DELTA.12 fatty acid desaturase mRNA by fungal elicitor)
- IT 185442-90-4, GenBank U75745 197698-97-8
RL: BPR (Biological process); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); PROC (Process)
(nucleotide sequence; rapid and transient induction of a parsley microsomal .DELTA.12 fatty acid desaturase mRNA by fungal elicitor)

L40 ANSWER 18 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1997:610711 HCAPLUS

DN 127:259443

ED Entered STN: 25 Sep 1997

TI The **oleate desaturase** product of the FAD2-N gene of hazel and its uses

IN Dani, Maria; Catello, Sergio

PA Soremartec S.A., Belg.; Ferrero S.P.A.

SO Eur. Pat. Appl., 29 pp.

CODEN: EPXXDW

DT Patent

LA English

IC ICM C12N015-53

ICS C12N015-82; C12N009-02; C12N005-10; C12Q001-68

ICA A01H005-00

CC 7-2 (Enzymes)

Section cross-reference(s): 3, 11, 17

FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|----|---------------------------|------|----------|-----------------|--------------|
| PI | EP 794250 | A1 | 19970910 | EP 1997-103098 | 19970226 <-- |
| | R: BE, ES, FR, GB, IT, NL | | | | |
| | AU 9714984 | A1 | 19970911 | AU 1997-14984 | 19970228 <-- |

AU 718602 B2 20000420
 US 6025172 A 20000215 US 1997-811177 19970304 <--
 PRAI CH 1996-550 A 19960304 <--
 AB The FAD2-N gene of hazel (*Corylus avellana* L.) coding for the .DELTA.12 desaturase enzyme of the microsomal fraction is cloned and characterized for use as a probe for the isolation of other plant desaturase genes. The gene can also be used to alter the desaturase levels and consequently the fatty-acid composition of a plant. Probes derived from the Arabidopsis .DELTA.12 desaturase gene were used to screen a hazel cDNA bank from ripe *Corylus avellana* cv. San Giovanni in .lambda.ZAPII.
 ST delta12 desaturase gene FAD2N *Corylus*; hazel delta12 desaturase gene FAD2N
 IT Gene, plant
 RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
 (FAD2-N; oleate desaturase product of FAD2-N gene of hazel and its uses)
 IT DNA sequences
cDNA sequences
 (for .DELTA.12 desaturase of hazel; oleate desaturase product of FAD2-N gene of hazel and its uses)
 IT Fats and Glyceridic oils, biological studies
 RL: AGR (Agricultural use); BOC (Biological occurrence); BSU (Biological study, unclassified); FFD (Food or feed use); BIOL (Biological study); OCCU (Occurrence); USES (Uses)
 (hazelnut, cloning of desaturase gene for altering fatty acid profile of; oleate desaturase product of FAD2-N gene of hazel and its uses)
 IT Fatty acids, biological studies
 RL: AGR (Agricultural use); BOC (Biological occurrence); BSU (Biological study, unclassified); FFD (Food or feed use); BIOL (Biological study); OCCU (Occurrence); USES (Uses)
 (of hazel, cloning of desaturase gene for altering profile of; oleate desaturase product of FAD2-N gene of hazel and its uses)
 IT Protein sequences
 (of .DELTA.12 desaturase of hazel; oleate desaturase product of FAD2-N gene of hazel and its uses)
 IT Hazel (*Corylus avellana*)
 (oleate desaturase product of FAD2-N gene of hazel and its uses)
 IT Endoplasmic reticulum
 (.DELTA.12 desaturase of hazelnut; oleate desaturase product of FAD2-N gene of hazel and its uses)
 IT 196217-78-4
 RL: AGR (Agricultural use); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
 (amino acid sequence; oleate desaturase product of FAD2-N gene of hazel and its uses)
 IT 196217-80-8
 RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
 (amino acid sequence; oleate desaturase product of FAD2-N gene of hazel and its uses)
 IT 196217-77-3 196217-79-5 196217-81-9
 RL: AGR (Agricultural use); BSU (Biological study, unclassified); BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
 (nucleotide sequence; oleate desaturase product of FAD2-N gene of hazel and its uses)
 IT 72536-70-0, Oleate desaturase
 RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
 (oleate desaturase product of FAD2-N gene of hazel and its uses)

- IT **196217-79-5**
 RL: AGR (Agricultural use); BSU (Biological study, unclassified); BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
 (nucleotide sequence; oleate desaturase product of FAD2-N gene of hazel and its uses)
- L40 ANSWER 19 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN
 AN **1997:544819** HCAPLUS
 DN 127:244754
 ED Entered STN: 27 Aug 1997
 TI Cloning and sequence of a gene for the homolog of the stearoyl CoA desaturase from **salivary glands** of the tick *Amblyomma americanum*
 AU Luo, C.; McSwain, J. L.; Tucker, J. S.; Sauer, J. R.; Essenberg, R. C.
 CS Departments of Biochemistry and Molecular Biology and Entomology, Oklahoma State University, Stillwater, OK, 74078, USA
 SO Insect Molecular Biology (1997), 6(3), 267-271
 CODEN: IMBIE3; ISSN: 0962-1075
 PB Blackwell
 DT Journal
 LA English
 CC 7-5 (Enzymes)
 Section cross-reference(s): 3, 12
- AB A 1488 base pair cDNA clone has been isolated from a cDNA library made from salivary glands from 3-day feeding adult female ticks. The sequence of this cDNA suggests it is the gene for the tick homolog of the stearoyl CoA desaturase. This gene is expressed in eggs and all feeding stages of the adult examined, but appears to be transcribed to an 8 kb mRNA as well as a 1.5 kb mRNA. Because ticks have the ability to synthesize monounsaturated fatty acids and demonstrate a large increase in salivary monounsaturated fatty acids during tick feeding, it is hypothesized that stearoyl CoA desaturase may be a key enzyme in the morphogenesis of tick salivary glands during feeding.
- ST sequence *Amblyomma* stearoyl CoA desaturase cDNA; tick salivary gland stearoyl CoA desaturase
 IT *Amblyomma americanum*
 Protein sequences
 Salivary gland
cDNA sequences
 (cloning and sequence of the stearoyl CoA desaturase gene from salivary glands of the tick *Amblyomma americanum*)
- IT **mRNA**
 RL: BOC (Biological occurrence); BSU (Biological study, unclassified); BIOL (Biological study); OCCU (Occurrence)
 (cloning and sequence of the stearoyl CoA desaturase gene from salivary glands of the tick *Amblyomma americanum*)
- IT Gene
 (expression; cloning and sequence of the stearoyl CoA desaturase gene from salivary glands of the tick *Amblyomma americanum*)
- IT Gene, animal
 RL: BOC (Biological occurrence); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); OCCU (Occurrence)
 (for stearoyl CoA desaturase; cloning and sequence of the stearoyl CoA desaturase gene from salivary glands of the tick *Amblyomma americanum*)
- IT 195538-57-9
 RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
 (amino acid sequence; cloning and sequence of the stearoyl CoA desaturase gene from salivary glands of the tick *Amblyomma americanum*)

IT 9014-34-0, Stearoyl-CoA desaturase
 RL: BSU (Biological study, unclassified); PRP (Properties); BIOL
 (Biological study)
 (cloning and sequence of the stearoyl CoA desaturase gene from salivary
 glands of the tick *Amblyomma americanum*)

IT 152371-13-6, GenBank U03281
 RL: BOC (Biological occurrence); BSU (Biological study, unclassified); PRP
 (Properties); BIOL (Biological study); OCCU (Occurrence)
 (nucleotide sequence; cloning and sequence of the stearoyl CoA
 desaturase gene from salivary glands of the tick *Amblyomma americanum*)

IT 152371-13-6, GenBank U03281
 RL: BOC (Biological occurrence); BSU (Biological study, unclassified); PRP
 (Properties); BIOL (Biological study); OCCU (Occurrence)
 (nucleotide sequence; cloning and sequence of the stearoyl CoA
 desaturase gene from salivary glands of the tick *Amblyomma americanum*)

L40 ANSWER 20 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN
 AN 1997:289974 HCAPLUS
 DN 126:274163
 ED Entered STN: 07 May 1997
 TI Cloning of cDNA for .omega.3-fatty acid desaturase of **sesame** for
 regulating plant linolenic acid content
 IN Shoji, Kazuaki
 PA Toyama Prefecture, Japan
 SO Jpn. Kokai Tokkyo Koho, 10 pp.
 CODEN: JKXXAF
 DT Patent
 LA Japanese
 IC ICM C12N015-09
 ICS A01H005-00; C07H021-04; C07K014-415; C12N001-21; C12N005-10;
 C12N009-04; C12R001-19
 CC 7-2 (Enzymes)
 Section cross-reference(s): 3, 11
 FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|----------------|------|----------|-----------------|--------------|
| PI | JP 09065882 | A2 | 19970311 | JP 1995-225145 | 19950901 <-- |
| PRAI | JP 1995-225145 | | 19950901 | <-- | |

AB The cDNA for .omega.3-fatty acid desaturase of sesame (*Sesamum indicum*)
 was isolated. The cDNA can be used for breeding plants high or low in
 linolenic acid.

ST sesame cDNA sequence fatty acid desaturase

IT **cDNA sequences**
 (for .omega.3-fatty acid desaturase; cloning of cDNA for .omega.3-fatty
 acid desaturase of sesame for regulating plant linolenic acid content)

IT Protein sequences
 (of .omega.3-fatty acid desaturase; cloning of cDNA for .omega.3-fatty
 acid desaturase of sesame for regulating plant linolenic acid content)

IT Plant (Embryophyta)
 (transgenic; cloning of cDNA for .omega.3-fatty acid desaturase of
 sesame for regulating plant linolenic acid content)

IT 188833-55-8, Desaturase, fatty acid .omega.3- (sesame)
 RL: AGR (Agricultural use); CAT (Catalyst use); PRP (Properties); BIOL
 (Biological study); USES (Uses)
 (amino acid sequence; cloning of cDNA for .omega.3-fatty acid
 desaturase of sesame for regulating plant linolenic acid content)

IT 71427-04-8
 RL: AGR (Agricultural use); CAT (Catalyst use); PRP (Properties); BIOL
 (Biological study); USES (Uses)
 (cloning of cDNA for .omega.3-fatty acid desaturase of sesame for

- regulating plant linolenic acid content)
- IT 463-40-1P, Linolenic acid
RL: BPN (Biosynthetic preparation); BIOL (Biological study); PREP (Preparation)
(cloning of cDNA for .omega.3-fatty acid desaturase of sesame for regulating plant linolenic acid content)
- IT 188833-54-7
RL: AGR (Agricultural use); BOC (Biological occurrence); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); OCCU (Occurrence); USES (Uses)
(nucleotide sequence; cloning of cDNA for .omega.3-fatty acid desaturase of sesame for regulating plant linolenic acid content)
- IT 188833-54-7
RL: AGR (Agricultural use); BOC (Biological occurrence); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); OCCU (Occurrence); USES (Uses)
(nucleotide sequence; cloning of cDNA for .omega.3-fatty acid desaturase of sesame for regulating plant linolenic acid content)
- L40 ANSWER 21 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1997:188911 HCAPLUS
DN 126:259918
ED Entered STN: 21 Mar 1997
TI Structure, chromosomal location and expression of a **rice gene** encoding the microsome .omega.-3 fatty acid desaturase
AU Kodama, Hiroaki; Akagi, Hiromori; Kusumi, Kensuke; Fujimura, Tatsuhito; Iba, Koh
CS Department of Biology, Faculty of Science, Kyushu University, Fukuoka, 812-81, Japan
SO Plant Molecular Biology (1997), 33(3), 493-502
CODEN: PMBIDB; ISSN: 0167-4412
PB Kluwer
DT Journal
LA English
CC 3-3 (Biochemical **Genetics**)
Section cross-reference(s): 7, 11
- AB The .omega.-3 fatty acid desaturases are membrane-bound enzymes catalyzing the conversion of linoleic acid to linolenic acid in lipids, and are located both in the microsome and plastid envelopes as two different isoforms. A cDNA encoding the microsome .omega.-3 fatty acid desaturase (OsFAD3) and the corresponding genomic clone were isolated from rice (*Oryza sativa* L.). The OsFAD3 gene was composed of 8 exons and 7 introns. A microsatellite was present in the second exon of the OsFAD3 gene, showing polymorphism between Indica and Japonica rice varieties. The mapping of this microsatellite showed that the OsFAD3 gene was located on chromosome 11. Expression of the OsFAD3 cDNA in tobacco hairy root tissues and subsequent anal. of fatty acid compns. demonstrated the activity of the microsome .omega.-3 fatty acid desaturase. The OsFAD3 mRNA was abundant in root tissues, but was hardly detectable in leaves. In root tissues, a high level of the OsFAD3 mRNA was observed at 15.degree. and 20.degree., with its level decreasing markedly at temps. below 10.degree.. The accumulation of the OsFAD3 mRNA in leaf tissues remained at quite low levels, both at normal growth temps. and at chilling temps. Similar temperature responses of the OsFAD3 gene were observed both in chilling-
tolerant and in chilling-intolerant rice cultivars.
- ST rice chromosome 11 gene FAD3 expression; sequence rice fatty acid desaturase gene
- IT Gene, plant
RL: BOC (Biological occurrence); BSU (Biological study, unclassified); PRP

(Properties); BIOL (Biological study); OCCU (Occurrence)
 (FAD3; structure, chromosomal location and expression of rice gene FAD3
 encoding the microsomal .omega.-3 fatty acid desaturase)

IT Gene
 (expression; structure, chromosomal location and expression of rice
 gene FAD3 encoding the microsomal .omega.-3 fatty acid desaturase)

IT Evolution
 (mol.; structure, chromosomal location and expression of rice gene FAD3
 encoding the microsomal .omega.-3 fatty acid desaturase)

IT Chromosome
 (rice 11; structure, chromosomal location and expression of rice gene
 FAD3 encoding the microsomal .omega.-3 fatty acid desaturase)

IT DNA sequences
 Genetic mapping
 Leaf
 Microsome
 Protein sequences
 Rice (Oryza sativa)
 Root
cDNA sequences
 (structure, chromosomal location and expression of rice gene FAD3
 encoding the microsomal .omega.-3 fatty acid desaturase)

IT **Microsatellite DNA**
mRNA
 RL: BOC (Biological occurrence); BSU (Biological study, unclassified);
 BIOL (Biological study); OCCU (Occurrence)
 (structure, chromosomal location and expression of rice gene FAD3
 encoding the microsomal .omega.-3 fatty acid desaturase)

IT 188764-20-7
 RL: BSU (Biological study, unclassified); PRP (Properties); BIOL
 (Biological study)
 (amino acid sequence; structure, chromosomal location and expression of
 rice gene FAD3 encoding the microsomal .omega.-3 fatty acid desaturase)

IT 171227-07-9, GenBank D78506 171227-08-0, GenBank D78505
 RL: BOC (Biological occurrence); BSU (Biological study, unclassified); PRP
 (Properties); BIOL (Biological study); OCCU (Occurrence)
 (nucleotide sequence; structure, chromosomal location and expression of
 rice gene FAD3 encoding the microsomal .omega.-3 fatty acid desaturase)

IT 67880-95-9, .omega.-3 Fatty acid desaturase
 RL: BSU (Biological study, unclassified); PRP (Properties); BIOL
 (Biological study)
 (structure, chromosomal location and expression of rice gene FAD3
 encoding the microsomal .omega.-3 fatty acid desaturase)

IT 171227-07-9, GenBank D78506 171227-08-0, GenBank D78505
 RL: BOC (Biological occurrence); BSU (Biological study, unclassified); PRP
 (Properties); BIOL (Biological study); OCCU (Occurrence)
 (nucleotide sequence; structure, chromosomal location and expression of
 rice gene FAD3 encoding the microsomal .omega.-3 fatty acid desaturase)

L40 ANSWER 22 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN
 AN 1996:527683 HCAPLUS
 DN 125:162111
 ED Entered STN: 03 Sep 1996
 TI Cloning of gene and cDNA for .omega.-3 fatty acid desaturase of rice for
 the preparation of **cold-resistant plants**
 IN Akagi, Hiromori; Fujimura, Tatsuto; Shimada, Hiroaki
 PA Mitsui Toatsu Chemicals, Japan
 SO Jpn. Kokai Tokkyo Koho, 12 pp.
 CODEN: JKXXAF
 DT Patent

LA Japanese
 IC ICM C12N015-09
 ICS A01H005-00; C12N009-02
 ICI C12N015-09, C12R001-91
 CC 7-2 (Enzymes)
 Section cross-reference(s): 3, 11

FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|---|------|----------|-----------------|--------------|
| PI | JP 08173167 | A2 | 19960709 | JP 1994-322806 | 19941226 <-- |
| PRAI | JP 1994-322806 | | 19941226 | <-- | |
| AB | Gene fad3 encoding .omega.-3 fatty acid desaturase is isolated from a rice (Oryza sativa L. cv. IR36) genomic DNA library. The cDNA sequence encoding the 384-amino acid enzyme is also cloned and its amino acid sequence deduced. The cDNA can be used for the preparation of transgenic plants with improved adaptability to low temperature | | | | |
| ST | rice omega 3 fatty acid desaturase; transgenic plant cold resistance; gene cDNA sequence fatty acid desaturase | | | | |
| IT | Deoxyribonucleic acid sequences Protein sequences (cloning of gene and cDNA for .omega.-3 fatty acid desaturase of rice for preparation of cold-resistant plants) | | | | |
| IT | Gene, plant RL: MSC (Miscellaneous) (cloning of gene and cDNA for .omega.-3 fatty acid desaturase of rice for preparation of cold-resistant plants) | | | | |
| IT | Plant (transgenic; cloning of gene and cDNA for .omega.-3 fatty acid desaturase of rice for preparation of cold-resistant plants) | | | | |
| IT | Temperature effects, biological (cold, resistance; cloning of gene and cDNA for .omega.-3 fatty acid desaturase of rice for preparation of cold-resistant plants) | | | | |
| IT | Deoxyribonucleic acid sequences (complementary, cloning of gene and cDNA for .omega.-3 fatty acid desaturase of rice for preparation of cold-resistant plants) | | | | |
| IT | 180474-17-3, Desaturase, fatty acid .omega.3- (rice) RL: AGR (Agricultural use); PRP (Properties); BIOL (Biological study); USES (Uses) (amino acid sequence; cloning of gene and cDNA for .omega.-3 fatty acid desaturase of rice for preparation of cold-resistant plants) | | | | |
| IT | 67880-95-9, .omega.-3 Fatty acid desaturase RL: AGR (Agricultural use); PRP (Properties); BIOL (Biological study); USES (Uses) (cloning of gene and cDNA for .omega.-3 fatty acid desaturase of rice for preparation of cold-resistant plants) | | | | |
| IT | 180474-15-1 180474-16-2 RL: AGR (Agricultural use); PRP (Properties); BIOL (Biological study); USES (Uses) (nucleotide sequence; cloning of gene and cDNA for .omega.-3 fatty acid desaturase of rice for preparation of cold-resistant plants) | | | | |
| IT | 180474-15-1 180474-16-2 RL: AGR (Agricultural use); PRP (Properties); BIOL (Biological study); USES (Uses) (nucleotide sequence; cloning of gene and cDNA for .omega.-3 fatty acid desaturase of rice for preparation of cold-resistant plants) | | | | |

L40 ANSWER 23 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN
 AN 1995:738944 HCAPLUS
 DN 123:190525
 ED Entered STN: 16 Aug 1995

TI Manufacture of **petroselinic acid** and .omega.-12
hexadecenoic acid in **transgenic plants** expressing the
.omega.-12 desaturase gene of coriander
IN Ohlrogge, John B.; Cahoon, Edgar B.; Shanklin, John; Somerville,
Christopher R.
PA Michigan State University, USA
SO U.S., 25 pp.
CODEN: USXXAM
DT Patent
LA English
IC ICM C12N015-29
NCL 536023200
CC 3-2 (Biochemical **Genetics**)
Section cross-reference(s): 11, 46

FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|----------------|------|--------------|-----------------|--------------|
| PI | US 5430134 | A | 19950704 | US 1992-926788 | 19920807 <-- |
| PRAI | US 1992-926788 | | 19920807 <-- | | |

AB A process for producing lipids containing the fatty acid petroselinic acid in plants by expression of the gene for an .omega.12 desaturase in the plant is described for use in the manufacture of industrial chems. Specifically, a desaturase cDNA from coriander is used. Cloning of an .omega.12 desaturase gene from coriander by screening an expression library from developing seed in .lambda.ZAPII with antibody to avocado .omega.9 18:0-ACP desaturase. A full-length cDNA was placed under control of the CaMV 35S promoter and introduced into tobacco by Agrobacterium. Control plants (transformed with vector only) showed no accumulation of petroselinic acid, whereas transformed plants showed an overall increase in C18 fatty acids and petroselinic acid as 2.7% of total fatty acids.

ST petroselinic acid manuf transgenic plant; coriander omega12 desaturase cDNA cloning expression

IT Gene, plant
RL: BOC (Biological occurrence); BSU (Biological study, unclassified); NUU (Other use, unclassified); PRP (Properties); BIOL (Biological study); OCCU (Occurrence); USES (Uses)
(cDNA, for coriander .omega.-12 desaturase; manufacture of petroselinic acid and .omega.-12 hexadecenoic acid in transgenic plants expressing .omega.-12 desaturase gene of coriander)

IT Protein sequences
(of .omega.-12 desaturase of coriander; manufacture of petroselinic acid and .omega.-12 hexadecenoic acid in transgenic plants expressing .omega.-12 desaturase gene of coriander)

IT **Plasmid and Episome**
(pEC301, coriander .omega.12 fatty acid desaturase cDNA on, expression in tobacco of; manufacture of petroselinic acid and .omega.-12 hexadecenoic acid in transgenic plants expressing .omega.-12 desaturase gene of coriander)

IT Glycerides, biological studies
RL: BSU (Biological study, unclassified); MFM (Metabolic formation); NUU (Other use, unclassified); BIOL (Biological study); FORM (Formation, nonpreparative); USES (Uses)
(petroselinic acid-containing, manufacture in transgenic plants of; manufacture of
petroselinic acid and .omega.-12 hexadecenoic acid in transgenic plants expressing .omega.-12 desaturase gene of coriander)

IT Plant
(transgenic; manufacture of petroselinic acid and .omega.-12 hexadecenoic acid in transgenic plants expressing .omega.-12 desaturase gene of coriander)

- IT Coriander
(.omega.-12 desaturase cDNA from; manufacture of petroselinic acid and .omega.-12 hexadecenoic acid in transgenic plants expressing .omega.-12 desaturase gene of coriander)
- IT Deoxyribonucleic acid sequences
(complementary, for .omega.-12 desaturase of coriander; manufacture of petroselinic acid and .omega.-12 hexadecenoic acid in transgenic plants expressing .omega.-12 desaturase gene of coriander)
- IT 149224-33-9
RL: BOC (Biological occurrence); BSU (Biological study, unclassified); NUU (Other use, unclassified); PRP (Properties); BIOL (Biological study); OCCU (Occurrence); USES (Uses)
(amino acid sequence; manufacture of petroselinic acid and .omega.-12 hexadecenoic acid in transgenic plants expressing .omega.-12 desaturase gene of coriander)
- IT 167973-63-9, Fatty acid .omega.12 desaturase
RL: BPR (Biological process); BSU (Biological study, unclassified); CAT (Catalyst use); BIOL (Biological study); PROC (Process); USES (Uses)
(gene for, heterologous expression of; manufacture of petroselinic acid and .omega.-12 hexadecenoic acid in transgenic plants expressing .omega.-12 desaturase gene of coriander)
- IT 593-39-5D, Petroselinic acid, glycerides 32342-49-7D, glycerides
RL: BSU (Biological study, unclassified); MFM (Metabolic formation); NUU (Other use, unclassified); BIOL (Biological study); FORM (Formation, nonpreparative); USES (Uses)
(manufacture of petroselinic acid and .omega.-12 hexadecenoic acid in transgenic plants expressing .omega.-12 desaturase gene of coriander)
- IT 145884-31-7
RL: BOC (Biological occurrence); BSU (Biological study, unclassified); NUU (Other use, unclassified); PRP (Properties); BIOL (Biological study); OCCU (Occurrence); USES (Uses)
(nucleotide sequence; manufacture of petroselinic acid and .omega.-12 hexadecenoic acid in transgenic plants expressing .omega.-12 desaturase gene of coriander)
- IT 145884-31-7
RL: BOC (Biological occurrence); BSU (Biological study, unclassified); NUU (Other use, unclassified); PRP (Properties); BIOL (Biological study); OCCU (Occurrence); USES (Uses)
(nucleotide sequence; manufacture of petroselinic acid and .omega.-12 hexadecenoic acid in transgenic plants expressing .omega.-12 desaturase gene of coriander)
- L40 ANSWER 24 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN
- AN 1995:632948 HCAPLUS
- DN 123:189783
- ED Entered STN: 23 Jun 1995
- TI Nucleotide sequence of a cDNA from *Limnanthes douglasii*
L. encoding a .DELTA.-15 linoleic acid desaturase
- AU Bhella, Resham S.; MacKenzie, Samuel L.
- CS Natl. Res. Council Canada, Plant Biotechnol. Inst., Saskatoon, SK, S7N 0W9, Can.
- SO Plant Physiology (1995), 108(2), 861
CODEN: PLPHAY; ISSN: 0032-0889
- PB American Society of Plant Physiologists
- DT Journal
- LA English
- CC 3-3 (Biochemical Genetics)
Section cross-reference(s): 7, 11
- AB A cDNA clone encoding a predicted plastidic .DELTA.-15-desaturase was isolated and characterized from *L. douglasii* (meadowfoam). The

- full-length cDNA encodes a 436-amino-acid proteins, and the deduced amino acid sequence exhibits 56% identity with the plastidic .DELTA.-15-desaturase from Arabidopsis thaliana and a microsomal .DELTA.-15-desaturase from Brassica napus.
- ST **linoleate desaturase** cDNA sequence Limnanthes;
meadowfoam **linoleate desaturase** cDNA sequence
- IT Limnanthes douglasii
(nucleotide sequence of a cDNA from Limnanthes douglasii encoding a .DELTA.-15 linoleic acid desaturase)
- IT Protein sequences
(of .DELTA.-15 **linoleate desaturase** from Limnanthes douglasii)
- IT Deoxyribonucleic acid sequences
(complementary, for .DELTA.-15 **linoleate desaturase** from Limnanthes douglasii)
- IT 165944-29-6
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(amino acid sequence; nucleotide sequence of a cDNA from Limnanthes douglasii encoding a .DELTA.-15 linoleic acid desaturase)
- IT 71427-04-8, Linoleate .DELTA.15-desaturase
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(nucleotide sequence of a cDNA from Limnanthes douglasii encoding a .DELTA.-15 linoleic acid desaturase)
- IT **163951-08-4**
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(nucleotide sequence; nucleotide sequence of a cDNA from Limnanthes douglasii encoding a .DELTA.-15 linoleic acid desaturase)
- IT **163951-08-4**
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(nucleotide sequence; nucleotide sequence of a cDNA from Limnanthes douglasii encoding a .DELTA.-15 linoleic acid desaturase)
- L40 ANSWER 25 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN
- AN **1995:632940** HCAPLUS
- DN 123:247966
- ED Entered STN: 23 Jun 1995
- TI Nucleotide sequence of a stearyl-acyl carrier protein desaturase cDNA from developing **seeds of rice**
- AU Akagi, Hiromori; Baba, Tadashi; Shimada, Hiroaki; Fujimura, Tatsuhito
- CS Plant Biotechnol. Dep., Life Sci. Inst., Mobara, 297, Japan
- SO Plant Physiology (1995), 108(2), 845-6
CODEN: PLPHAY; ISSN: 0032-0889
- PB American Society of Plant Physiologists
- DT Journal
- LA English
- CC 3-3 (Biochemical **Genetics**)
Section cross-reference(s): 7, 11
- AB A cDNA clone, pRD9D-8, was prepared from developing rice seeds and was found to be 1667 bp long, encompassing an open reading frame encoding a polypeptide of 390 amino acid residues. This open reading frame may code for a precursor protein with a transit peptide to translocate this enzyme into the proplastid, since the stearyl-ACP desaturase is localized in the stroma of plastids. Comparison of the precursor protein of rice with those of dicotyledonous plants showed 71-82% amino acid sequence identity; however, the N-terminal sequence of 41 amino acid residues were poorly conserved between rice and dicotyledonous plants. However, the exact

cleavage site of the transit peptide is unclear.

ST rice gene stearyl ACP desaturase sequence

IT Protein sequences

Rice

(nucleotide sequence of a stearyl-acyl carrier protein desaturase cDNA from developing seeds of rice)

IT Gene, plant

RL: BOC (Biological occurrence); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); OCCU (Occurrence)

(stearyl-acyl carrier protein desaturase -encoding; nucleotide sequence of a stearyl-acyl carrier protein desaturase cDNA from developing seeds of rice)

IT Deoxyribonucleic acid sequences

(complementary, nucleotide sequence of a stearyl-acyl carrier protein desaturase cDNA from developing seeds of rice)

IT 37256-86-3, Desaturase, acyl-[acyl carrier protein]

RL: BOC (Biological occurrence); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); OCCU (Occurrence)

(gene encoding; nucleotide sequence of a stearyl-acyl carrier protein desaturase cDNA from developing seeds of rice)

IT 168854-29-3

RL: BOC (Biological occurrence); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); OCCU (Occurrence)

(nucleotide sequence; nucleotide sequence of a stearyl-acyl carrier protein desaturase cDNA from developing seeds of rice)

IT 168854-29-3

RL: BOC (Biological occurrence); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); OCCU (Occurrence)

(nucleotide sequence; nucleotide sequence of a stearyl-acyl carrier protein desaturase cDNA from developing seeds of rice)

L40 ANSWER 26 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1994:626646 HCAPLUS

DN 121:226646

ED Entered STN: 12 Nov 1994

TI Molecular cloning of cDNA for microsomal delta-12 fatty acid desaturases and their use for **molecular breeding** of plants

IN Lightner, Jonathan Edward; Okuley, John Joseph

PA du Pont de Nemours, E. I., and Co., USA

SO PCT Int. Appl., 147 pp.

CODEN: PIXXD2

DT Patent

LA English

IC ICM C12N015-53

ICS C12N015-82; C11B001-00; C12Q001-68; A01H005-00

CC 11-1 (Plant Biochemistry)

Section cross-reference(s): 3, 17

FAN.CNT 1

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|--|------|----------|-----------------|--------------|
| WO 9411516 | A1 | 19940526 | WO 1993-US9987 | 19931015 <-- |
| W: AU, BR, CA, JP, US | | | | |
| RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE | | | | |
| CA 2149223 | AA | 19940526 | CA 1993-2149223 | 19931015 <-- |
| AU 9454075 | A1 | 19940608 | AU 1994-54075 | 19931015 <-- |
| EP 668919 | A1 | 19950830 | EP 1993-924360 | 19931015 <-- |
| EP 668919 | B1 | 20030604 | | |
| R: DE, DK, ES, FR, GB, IT, NL, SE | | | | |
| JP 08503364 | T2 | 19960416 | JP 1993-512093 | 19931015 <-- |
| ES 2198408 | T3 | 20040201 | ES 1993-924360 | 19931015 <-- |

| | | | | |
|---------------------|--|--------------|----------------|--------------|
| AU 9869841 | A1 | 19981001 | AU 1998-69841 | 19980601 <-- |
| AU 731298 | B2 | 20010329 | | |
| US 6372965 | B1 | 20020416 | US 1998-133962 | 19980814 <-- |
| US 2003033633 | A1 | 20030213 | US 2002-108795 | 20020328 <-- |
| US 2003066104 | A1 | 20030403 | US 2002-115364 | 20020403 <-- |
| US 2003074694 | A1 | 20030417 | US 2002-115365 | 20020403 <-- |
| US 2003163844 | A1 | 20030828 | US 2002-116212 | 20020403 <-- |
| PRAI US 1992-977339 | A | 19921117 <-- | | |
| WO 1993-US9987 | W | 19931015 <-- | | |
| US 1994-262401 | B1 | 19940620 <-- | | |
| US 1998-133962 | A3 | 19980814 | | |
| US 2000-697374 | A3 | 20001026 | | |
| US 2000-697379 | A3 | 20001026 | | |
| AB | The preparation and use of nucleic acid fragments encoding fatty acid desaturases and related enzymes are described. The invention permits alteration of plant lipid composition. Chimeric genes incorporating such nucleic acid fragments with suitable regulatory sequences may be used to create transgenic plants with altered levels of unsatd. fatty acids. The cloning of cDNA for fatty acid .DELTA.12-desaturases (oleoyl-CoA desaturases) from Arabidopsis thaliana, Brassica napus, Glycine max, Zea mays, and Ricinus communis was demonstrated. The expression of antisense G. max fatty acid .DELTA.12-desaturase cDNA in soybeans to reduce the expression of the enzyme in developing soybean seeds and use of the cDNA sequences for restriction fragment length polymorphism (RFLP) mapping was also demonstrated. | | | |
| ST | plant fatty acid desaturase cDNA cloning; breeding lipid compn transgenic plant | | | |
| IT | Plant breeding and selection | | | |
| | (cloning of fatty acid desaturase cDNA in relation to) | | | |
| IT | Canola | | | |
| | Soybean | | | |
| | (fatty acid desaturase expression in, antisense cDNA for reduction of) | | | |
| IT | Protein sequences | | | |
| | (of plant microsomal fatty acid desaturases) | | | |
| IT | Plasmid and Episome | | | |
| | (pZPhCFd2R, pZCCFd2R, pZKCFd2R, fatty acid desaturase antisense cDNA of Brassica napus on, for expression reduction) | | | |
| IT | Fats and Glyceridic oils | | | |
| | RL: PRP (Properties) | | | |
| | (transgenic plant cells having altered level of, cloning of fatty acid desaturase in relation to) | | | |
| IT | Plant | | | |
| | (transgenic, unsatd. fatty acid level regulation in, cloning of cDNA for fatty acid desaturase in relation to) | | | |
| IT | Deoxyribonucleic acid sequences | | | |
| | (complementary, for plant microsomal fatty acid desaturases) | | | |
| IT | Deoxyribonucleic acids | | | |
| | RL: BIOL (Biological study) | | | |
| | (complementary, antisense, for fatty acid desaturase, for reducing desaturase gene expression in transgenic plants) | | | |
| IT | Plasmid and Episome | | | |
| | (pST11, fatty acid desaturase antisense cDNA of Glycine max on, for expression reduction) | | | |
| IT | Genetic polymorphism | | | |
| | (restriction fragment length, Genetic mapping, of gene for fatty acid desaturase of plants, cloning of fatty acid desaturase cDNA in relation to) | | | |
| IT | Fatty acids, biological studies | | | |
| | RL: PRP (Properties) | | | |

- (unsatd., transgenic plant cells having altered level of, cloning of fatty acid desaturase in relation to)
- IT 158283-24-0, .delta.-12 Fatty acid desaturase (Arabidopsis thaliana clone p92103) 158283-26-2, .delta.-12 Fatty acid desaturase (Brassica napus clone pCF2-165D) 158283-28-4, .delta.-12 Fatty acid desaturase (Glycine max clone pSF2-165K) 158283-30-8, .delta.-12 Fatty acid desaturase (Zea mays clone pFad2#1) 158283-32-0, .delta.-12 Fatty acid desaturase (Ricinus communis clone pRF2-1C) 158283-34-2, .delta.-12 Fatty acid desaturase (Ricinus communis clone pRF197C-42)
RL: BIOL (Biological study)
(amino acid sequence of and cloning of cDNA for, mol. breeding in relation to)
- IT 77950-95-9, Fatty acid .DELTA.12-hydroxylase
RL: BIOL (Biological study)
(gene for, method for cloning of)
- IT 84628-81-9
RL: BIOL (Biological study)
(gene for, of plants, method for cloning of)
- IT 158283-35-3, DNA (Arabidopsis thaliana clone pAGF2-6 .delta.-12 fatty acid desaturase gene)
RL: PRP (Properties); BIOL (Biological study)
(nucleotide sequence and cloning of)
- IT 152410-16-7, DNA (Arabidopsis thaliana clone p92103 .delta.-12 fatty acid desaturase cDNA and flanks) 158283-25-1, DNA (Brassica napus clone pCF2-165D fatty acid desaturase cDNA and flanks) 158283-27-3, DNA (Glycine max clone pSF2-165K .delta.-12 fatty acid desaturase cDNA and flanks) 158283-29-5, DNA (Zea mays clone pFad2#1 .delta.-12 fatty acid desaturase cDNA and flanks) 158283-31-9, DNA (Ricinus communis clone pRF2-1C .delta.-12 fatty acid desaturase cDNA and flanks) 158283-33-1, DNA (Ricinus communis clone pRF197C-42 .delta.-12 fatty acid desaturase cDNA and flanks)
RL: PRP (Properties); BIOL (Biological study)
(nucleotide sequence and cloning of, mol. breeding in relation to)
- IT 141-22-0, Ricinoleic acid
RL: PRP (Properties)
(transgenic plant cells having altered level of, cloning of fatty acid desaturase in relation to)
- IT 158283-35-3, DNA (Arabidopsis thaliana clone pAGF2-6 .delta.-12 fatty acid desaturase gene)
RL: PRP (Properties); BIOL (Biological study)
(nucleotide sequence and cloning of)
- IT 152410-16-7, DNA (Arabidopsis thaliana clone p92103 .delta.-12 fatty acid desaturase cDNA and flanks) 158283-25-1, DNA (Brassica napus clone pCF2-165D fatty acid desaturase cDNA and flanks) 158283-27-3, DNA (Glycine max clone pSF2-165K .delta.-12 fatty acid desaturase cDNA and flanks) 158283-29-5, DNA (Zea mays clone pFad2#1 .delta.-12 fatty acid desaturase cDNA and flanks) 158283-31-9, DNA (Ricinus communis clone pRF2-1C .delta.-12 fatty acid desaturase cDNA and flanks) 158283-33-1, DNA (Ricinus communis clone pRF197C-42 .delta.-12 fatty acid desaturase cDNA and flanks)
RL: PRP (Properties); BIOL (Biological study)
(nucleotide sequence and cloning of, mol. breeding in relation to)
- L40 ANSWER 27 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN
AN 1994:551858 HCAPLUS
DN 121:151858
ED Entered STN: 01 Oct 1994
TI Cloning of a higher-plant plastid .omega.-6 fatty

acid desaturase cDNA and its expression in a cyanobacterium

- AU Hitz, William D.; Carlson, Thomas J.; Booth, J. Russell, Jr.; Kinney, Anthony J.; Stecca, Kevin L.; Yadav, Narendra S.
 CS Cent. Res. Dev. Agric. Products, Wilmington, DE, 19880-0402, USA
 SO Plant Physiology (1994), 105(2), 635-41
 CODEN: PLPHAY; ISSN: 0032-0889
 DT Journal
 LA English
 CC 7-2 (Enzymes)
 Section cross-reference(s): 3, 11
- AB Oligomers based on amino acids conserved between known plant .omega.-3 and cyanobacterium .omega.-6 fatty acid desaturases were used to screen an Arabidopsis cDNA library for related sequences. An identified clone encoding a novel desaturase-like polypeptide was used to isolate its homologs from Glycine max and Brassica napus. The plant deduced amino acid sequences showed less than 27% similarity to known plant .omega.-6 and .omega.-3 desaturases but more than 48% similarity to cyanobacterial .omega.-6 desaturase, and they contained putative plastid transit sequences. Thus, the authors deduce that the plant cDNAs encode the plastid .omega.-6 desaturase. The identity was supported by expression of the B. napus cDNA in cyanobacterium. Synechococcus transformed with a chimeric gene that contains a prokaryotic promoter fused to the rapeseed cDNA encoding all but the first 73 amino acids partially converted its oleic acid fatty acid to linoleic acid, and the 16:1(9c) fatty acid was converted primarily to 16:2(9c,12) in vivo. Thus, the plant .omega.-6 desaturase, which utilizes 16:1(7c) in plants, can utilize 16:1(9c) in the cyanobacterium. The plastid and cytosolic homologs of plant .omega.-6 desaturases are much more distantly related than those of .omega.-6 desaturases.
- ST fatty acid desaturase cDNA Brassica cloning; soybean fatty acid desaturase cDNA cloning; Synechococcus plant fatty acid desaturase
- IT Gene, plant
 RL: BIOL (Biological study)
 (cDNA, for plastid .omega.-6 **fatty acid desaturase** of Glycine max and Brassica napus, cloning and expression of)
- IT Synechococcus
 (expression in, of cDNA for plastid .omega.-6 **fatty acid desaturase** of Brassica napus)
- IT Protein sequences
 (of plastid .omega.-6 **fatty acid desaturases** of Brassica napus and Glycine max)
- IT Brassica napus
 Soybean
 (plastid .omega.-6 **fatty acid desaturase** of, cDNA for, cloning and expression in Synechococcus of)
- IT Plastid
 (.omega.-6 **fatty acid desaturase** of, of Brassica napus and Glycine max, cloning and expression of cDNA for)
- IT Deoxyribonucleic acid sequences
 (complementary, for plastid .omega.-6 **fatty acid desaturases** of Brassica napus and Glycine max)
- IT Fatty acids, preparation
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (unsatd., synthesis of, cloning and expression of higher plant plastid .omega.-6 **fatty acid desaturase** cDNAs in relation to)

IT 157514-53-9 157514-54-0
 RL: BIOL (Biological study)
 (amino acid sequence of and cloning and expression of cDNA for)

IT 153638-19-8
 RL: BIOL (Biological study)
 (nucleotide sequence and cloning and expression in *Synechococcus* of)

IT 153793-07-8
 RL: PRP (Properties); BIOL (Biological study)
 (nucleotide sequence and cloning of)

IT 66829-01-4, .omega.6 **Fatty acid desaturase**
 RL: BIOL (Biological study)
 (plastid, cDNAs for, of *Glycine max* and *Brassica napus*, cloning of)

IT 153638-19-8
 RL: BIOL (Biological study)
 (nucleotide sequence and cloning and expression in *Synechococcus* of)

IT 153793-07-8
 RL: PRP (Properties); BIOL (Biological study)
 (nucleotide sequence and cloning of)

L40 ANSWER 28 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN
 AN 1994:237603 HCAPLUS
 DN 120:237603
 ED Entered STN: 14 May 1994
 TI Molecular cloning of plant cDNA for **petroselinic acid**
 producing enzyme and delta9desaturase
 IN Murphy, Denis Joseph; Fairbairn, David James; Slocombe, Stephen Peter
 PA The Minister of Agriculture, Fisheries and Food in Her Britannic Majesty's
 Government of the United Kingdom of Great Britain and Northern Ireland, UK
 SO PCT Int. Appl., 25 pp.
 CODEN: PIXXD2
 DT Patent
 LA English
 IC ICM C12N015-53
 ICS C12N015-82; C12N009-02; A01H005-00; C12P007-64
 CC 3-2 (Biochemical **Genetics**)
 Section cross-reference(s): 11
 FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|---|------|--------------|-----------------|--------------|
| PI | WO 9401565 | A1 | 19940120 | WO 1993-GB1385 | 19930701 <-- |
| | W: AU, CA | | | | |
| | RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE | | | | |
| | AU 9345083 | A1 | 19940131 | AU 1993-45083 | 19930701 <-- |
| | AU 672613 | B2 | 19961010 | | |
| | EP 603371 | A1 | 19940629 | EP 1993-914862 | 19930701 <-- |
| | R: AT, DE, DK, FR, GB, SE | | | | |
| PRAI | GB 1992-13969 | | 19920701 <-- | | |
| | WO 1993-GB1385 | | 19930701 <-- | | |
| AB | The cDNA for petroselinic acid producing enzyme (delta6/delta4 desaturase; PAPD) and delta9desaturase of <i>Coriandrum sativum</i> and <i>Brassica napus</i> , resp., were cloned, sequenced, and their amino acids deduced. The PAPD-coding cDNA can be used for the preparation of transgenic oilseed rape plants to enhance the production of petroselinic acid. | | | | |
| ST | petroselinic acid producing enzyme cDNA cloning; transgenic plant petroselinic acid prodn | | | | |
| IT | Gene, plant | | | | |
| | RL: BIOL (Biological study) (cDNA, for petroselinic acid producing enzyme of <i>Coriandrum sativum</i> , cloning and expression of) | | | | |

IT Protein sequences
 (of petroselinic acid producing enzyme of Coriandrum sativum)

IT Carrot
 Daucus
 (petroselinic acid producing enzyme of)

IT Brassica napus
 Coriander
 Coriandrum
 Plant
 Seed
 Umbelliflorae
 (transgenic, expression of cDNA for petroselinic acid producing enzyme
 in, for enhanced petroselinic acid production)

IT Deoxyribonucleic acid sequences
 (complementary, for petroselinic acid producing enzyme of Coriandrum
 sativum)

IT 154431-47-7, Petroselinic acid producing enzyme (Coriandrum sativum)
 RL: BIOL (Biological study)
 (amino acid sequence of and cloning and expression of cDNA for)

IT 148466-86-8, Delta9desaturase (Brassica napus)
 RL: PRP (Properties); BIOL (Biological study)
 (amino acid sequence of and cloning of cDNA for)

IT 143910-98-9
 RL: PRP (Properties); BIOL (Biological study)
 (nucleotide sequence and cloning of)

IT 593-39-5P, Petroselinic acid
 RL: PREP (Preparation)
 (production of, cloning of plant cDNA for petroselinic acid producing
 enzyme in relation to)

IT 143910-98-9
 RL: PRP (Properties); BIOL (Biological study)
 (nucleotide sequence and cloning of)

L40 ANSWER 29 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1994:128425 HCAPLUS

DN 120:128425

ED Entered STN: 19 Mar 1994

TI Phytoene desaturase from **Arabidopsis**

AU Scolnik, Pablo A.; Bartley, Glenn E.

CS Exp. Stn., E. I. Du Pont de Nemours and Co., Wilmington, DE, 19880-0402,
 USA

SO Plant Physiology (1993), 103(4), 1475
 CODEN: PLPHAY; ISSN: 0032-0889

DT Journal

LA English

CC 7-5 (Enzymes)
 Section cross-reference(s): 3

AB A cDNA for phytoene desaturase (PDS) was isolated from Arabidopsis
 thaliana by screening a .lambda.ZAP cDNA library using a random-primed
 32P-labeled PDS cDNA from tomato. The sequence contains a good consensus
 translation start site at the 5' end of the open reading frame, and
 encodes a protein of 566 amino acids with a putative transit peptide and a
 nucleotide-binding site motif in the N-terminal region of the mature
 peptide. Soybean mature PDS sequence showed 80% identity at the
 nucleotide level and 88.5% identity and 92.7% similarity at the amino acid
 level.

ST phytoene desaturase cDNA sequence Arabidopsis

IT Protein sequences
 (of phytoene desaturase, of Arabidopsis thaliana)

IT Arabidopsis thaliana

(phytoene desaturase of, sequence of cDNA for)

IT Deoxyribonucleic acid sequences
(complementary, for phytoene desaturase, of Arabidopsis thaliana)

IT 153133-13-2, Phytoene desaturase (Arabidopsis thaliana strain Columbia precursor)
RL: PRP (Properties); BIOL (Biological study)
(amino acid sequence of)

IT **149450-41-9**
RL: PRP (Properties); BIOL (Biological study)
(nucleotide sequence of)

IT **149450-41-9**
RL: PRP (Properties); BIOL (Biological study)
(nucleotide sequence of)

L40 ANSWER 30 OF 30 HCAPLUS COPYRIGHT 2004 ACS on STN

AN **1992:52949** HCAPLUS

DN 116:52949

ED Entered STN: 21 Feb 1992

TI Cloning of plant desaturase cDNA and its expression in **transgenic plants**

IN Thompson, Gregory A.; Knauf, Vic C.

PA Calgene, Inc., USA

SO PCT Int. Appl., 130 pp.
CODEN: PIXXD2

DT Patent

LA English

IC ICM C12N001-21
ICS C12N015-29; C12N015-82; C07H015-12

CC 3-4 (Biochemical **Genetics**)
Section cross-reference(s): 11, 17

FAN.CNT 6

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|--|------|----------|-----------------|--------------|
| PI | WO 9113972 | A1 | 19910919 | WO 1991-US1746 | 19910314 <-- |
| | W: CA, JP, US | | | | |
| | RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LU, NL, SE | | | | |
| | EP 472722 | A1 | 19920304 | EP 1991-907317 | 19910314 <-- |
| | EP 472722 | B1 | 20030521 | | |
| | R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE | | | | |
| | AT 241007 | E | 20030615 | AT 1991-907317 | 19910314 <-- |
| | US 6117677 | A | 20000912 | US 1992-979461 | 19921120 <-- |
| | US 5723595 | A | 19980303 | US 1995-471791 | 19950606 <-- |
| | US 6426447 | B1 | 20020730 | US 1997-926522 | 19970909 <-- |
| | US 2003097686 | A1 | 20030522 | US 2002-100121 | 20020318 <-- |
| PRAI | US 1990-494106 | A2 | 19900316 | <-- | |
| | US 1990-567373 | A | 19900813 | <-- | |
| | US 1990-615784 | A | 19901114 | <-- | |
| | WO 1991-US1746 | W | 19910314 | <-- | |
| | US 1991-762761 | A1 | 19910626 | <-- | |
| | WO 1991-US5801 | W | 19910815 | <-- | |
| | US 1991-762762 | B2 | 19910916 | <-- | |
| | US 1992-949102 | A2 | 19920921 | <-- | |
| | US 1995-458173 | B1 | 19950602 | <-- | |
| | US 1997-926522 | A3 | 19970909 | <-- | |
| AB | CDNAs encoding plant fatty acid desaturases are cloned and expressed in bacterial and plant hosts. Altering the level of expression of the gene is useful in modulating the unsatd. fatty acid content of vegetable oils (no data). The safflower .DELTA.9 fatty acyl CoA desaturase was purified and sequenced by standard methods, and from the sequence oligonucleotide probes and polymerase chain reaction primers were derived for screening a | | | | |

- cDNA bank. The gene was transcribed in *Escherichia coli* but the enzyme was unable to use *E. coli* ferredoxin. A plant ferredoxin (e.g. from spinach) was necessary for enzymic activity. When the cDNA was placed under the control of a napin gene promoter and introduced into *Brassica napus* by *Agrobacterium*-mediated transformation regenerated plants showed some elevation of fatty acid desaturase activity.
- ST fatty acid desaturase cDNA safflower; *Brassica* heterologous fatty acid desaturase
- IT Gene, plant
RL: BIOL (Biological study)
(cDNA, for safflower fatty acid desaturase, cloning in *Escherichia coli* and expression in *E. coli* and *Brassica* of)
- IT Seed
(embryo of, modified lipid content of, cloning and expression of safflower fatty acid reductase cDNA in relation to)
- IT Peanut
(expression in, of cDNA for safflower fatty acid desaturase)
- IT *Brassica napus*
(expression in, of safflower fatty acid reductase cDNA, effects on fatty acid content of oil of)
- IT *Brassica campestris*
Castor-oil plant
Safflower
(fatty acid desaturase of, gene for, cloning and heterologous expression of, modulation of plant oil lipid composition in relation to)
- IT California laurel
Cuphea hookeriana
Jojoba
(fatty acid desaturase of, gene for, tissue-specific expression of)
- IT Deoxyribonucleic acid sequences
(fatty acid desaturase-specifying, of rice, complete)
- IT Deoxyribonucleic acid sequences
(fatty acid desaturase-specifying, of safflower, complete)
- IT Deoxyribonucleic acid sequences
(fatty acid desaturase-specifying, of *Brassica campestris*, complete)
- IT Glycerides, preparation
Lipids, preparation
RL: PREP (Preparation)
(in plants, modulation of fatty acid composition of, expression of heterologous cDNA for fatty acid CoA reductase in relation to)
- IT Deoxyribonucleic acid sequences
(napin 1-2-specifying, of *Brassica napus*, complete)
- IT Protein sequences
(of fatty acid desaturase, of rice, complete)
- IT Protein sequences
(of fatty acid desaturase, of safflower, complete)
- IT Protein sequences
(of fatty acid desaturase, of *Brassica campestris*, complete)
- IT Protein sequences
(of napin 1-2, of *Brassica napus*, complete)
- IT **Molecular cloning**
(of safflower fatty acid desaturase cDNA, in *Escherichia coli*)
- IT Deoxyribonucleic acid sequences
(of Bce4 gene of *Brassica*, complete)
- IT Protein sequences
(of Bce4 gene product, of *Brassica*, complete)
- IT Deoxyribonucleic acid sequences
(of Bcg4-4 gene of *Brassica*, complete)
- IT Protein sequences
(of Bcg4-4 gene product, of *Brassica*, complete)

- IT **Plasmid and Episome**
(pCGN1895, safflower fatty acid desaturase cDNA on, expression in plants of)
- IT **Plasmid and Episome**
(pCGN1898, binary plant vector)
- IT **Plasmid and Episome**
(pCGN2754, safflower fatty acid desaturase cDNA on, cloning in *Escherichia coli* of)
- IT **Plasmid and Episome**
(pCGN3201, safflower fatty acid desaturase cDNA on, expression in *Escherichia coli* of)
- IT **Plasmid and Episome**
(pCGN3222, safflower fatty acid desaturase cDNA on, expression in plants of)
- IT **Plasmid and Episome**
(pCGN3231, safflower fatty acid desaturase cDNA on, expression in plants of)
- IT **Plasmid and Episome**
(pCGN3239, antisense gene for safflower fatty acid desaturase on, expression in transgenic plants of)
- IT **Plasmid and Episome**
(pCGN3242, antisense gene for safflower fatty acid desaturase on, expression in transgenic *Brassica campestris* of)
- IT **Ferredoxins**
RL: BIOL (Biological study)
(plant, as cofactor for plant fatty acid desaturase)
- IT **Gene, plant**
RL: BIOL (Biological study)
(Bce4, regulatory region of, in heterologous expression of safflower fatty acid reductase cDNA)
- IT **Gene, plant**
RL: BIOL (Biological study)
(Bcg4-4, regulatory region of, in heterologous expression of safflower fatty acid reductase cDNA)
- IT **Ribonucleic acids**
RL: BIOL (Biological study)
(**antisense**, from safflower fatty acid desaturase cDNA)
- IT **Virus, bacterial**
(lambda, CGN 1-2 (recombinant), napin 1-2 gene of *Brassica napus* on, cloning in *Escherichia coli* of)
- IT **Albumins, biological studies**
RL: BIOL (Biological study)
(napins, 1-2, gene for, regulatory region of, in heterologous expression of safflower fatty acid reductase cDNA)
- IT **Seed**
(oil-, embryo of, modified lipid content of, cloning and expression of safflower fatty acid reductase cDNA in relation to)
- IT **Fatty acids, biological studies**
RL: BIOL (Biological study)
(rape-oil, unsatd. fatty acid content of, modulation of, cloning and expression of safflower fatty acid reductase cDNA in relation to)
- IT **Peptides, biological studies**
RL: BIOL (Biological study)
(transit, of safflower fatty acid desaturase)
- IT **Fatty acids, biological studies**
RL: BIOL (Biological study)
(unsatd., in plant oils, modulation of levels of, cloning and heterologous expression of safflower fatty acid desaturase cDNA in relation to)
- IT 136111-42-7 136250-40-3 138576-19-9 138576-20-2

RL: BIOL (Biological study)
 (amino acid sequence and cloning in Escherichia coli of cDNA for)

IT 115728-10-4, Napin (Brassica campestris clone .lambda.CGN1-2 reduced)
 137747-80-9 138238-51-4, Protein (Brassica campestris strain R500 gene
 Bce4 reduced)
 RL: PRP (Properties)
 (amino acid sequence of)

IT 9014-34-0, Fatty acid .DELTA.9 desaturase
 RL: BIOL (Biological study)
 (cDNA for, of safflower, cloning in Escherichia coli and expression in
 E. coli and Brassica of)

IT 136110-14-0, Deoxyribonucleic acid (castor-oil plant clone pRCD1
 [acyl carrier protein] acyl desaturase messenger RNA-complementary)
 136249-91-7, Deoxyribonucleic acid (safflower clone pCGN2754 [acyl
 carrier protein] acyl desaturase messenger RNA-complementary)
 136249-92-8 138575-61-8 138575-62-9
 138575-65-2
 RL: BIOL (Biological study)
 (nucleic acid sequence and cloning in Escherichia coli of)

IT 138238-10-5, Deoxyribonucleic acid (Brassica campestris strain R500 gene
 Bce4 protein messenger RNA-complementary) 138575-63-0, Deoxyribonucleic
 acid (Brassica campestris clone pCGN1977 gene Bcg4-4 plus 5'- and
 3'-flanking region fragment) 138575-64-1, Deoxyribonucleic acid
 (Brassica campestris clone pCGN1857 gene Bce4 plus 5'- and 3'-flanking
 region fragment)
 RL: PRP (Properties); BIOL (Biological study)
 (nucleotide sequence and cloning of, expression of heterologous genes
 in Brassica in relation to)

IT 115727-74-7, Deoxyribonucleic acid (Brassica campestris clone
 .lambda.CGN1-2 napin gene) 138575-60-7, Deoxyribonucleic acid (Brassica
 campestris clone .lambda.CGN1-2 napin gene plus 5'- and 3'-flanking region
 fragment)
 RL: PRP (Properties); BIOL (Biological study)
 (nucleotide sequence of)

IT 136110-14-0, Deoxyribonucleic acid (castor-oil plant clone pRCD1
 [acyl carrier protein] acyl desaturase messenger RNA-complementary)
 136249-91-7, Deoxyribonucleic acid (safflower clone pCGN2754 [acyl
 carrier protein] acyl desaturase messenger RNA-complementary)
 136249-92-8 138575-61-8 138575-62-9
 138575-65-2
 RL: BIOL (Biological study)
 (nucleic acid sequence and cloning in Escherichia coli of)

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L41 ANSWER 1 OF 9 HCAPLUS COPYRIGHT 2004 ACS on STN
 AN 2002:182219 HCAPLUS
 DN 136:242927
 ED Entered STN: 14 Mar 2002
 TI Cloning of **.DELTA.6-desaturase** gene from
 evening primrose and its use in .gamma. linolenic acid (GLA)
 transgenic plants
 IN **Thomas, Terry L.**
 PA **Rhone-Poulenc** Agrochimie, Fr.
 SO U.S., 53 pp., Cont.-in-part of U.S. 5,789,220.
 CODEN: USXXAM
 DT Patent
 LA English
 IC ICM A01H005-00
 ICS C12N015-82; C12N005-04; C12N015-09

L41:
 Applicant

NCL 800281000
 CC 3-2 (Biochemical **Genetics**)
 Section cross-reference(s): 7, 10, 11, 17
 FAN.CNT 4

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|---|------|----------|-----------------|--------------|
| PI | US 6355861 | B1 | 20020312 | US 1997-934254 | 19970919 <-- |
| | ZA 9207777 | A | 19930421 | ZA 1992-7777 | 19921009 <-- |
| | US 5552306 | A | 19960903 | US 1994-307382 | 19940914 <-- |
| | US 5789220 | A | 19980804 | US 1997-789936 | 19970128 <-- |
| | US 6683232 | B1 | 20040127 | US 2000-685775 | 20001010 <-- |
| | US 2002108147 | A1 | 20020808 | US 2001-29756 | 20011221 <-- |
| | US 2004078845 | A1 | 20040422 | US 2003-702777 | 20031106 <-- |
| PRAI | US 1991-774475 | B2 | 19911010 | | <-- |
| | US 1992-817919 | B2 | 19920108 | | <-- |
| | US 1992-959952 | B1 | 19921013 | | <-- |
| | US 1994-307382 | A2 | 19940914 | | <-- |
| | US 1997-789936 | A2 | 19970128 | | <-- |
| | US 1994-366779 | A1 | 19941230 | | <-- |
| | US 1997-934254 | A3 | 19970919 | | <-- |
| | US 2000-685775 | A3 | 20001010 | | |
| AB | Linoleic acid is converted into .gamma.-linolenic acid by the enzyme .DELTA.6-desaturase. The present invention is directed to isolated nucleic acids comprising the .DELTA.6-desaturase gene from evening primrose. More particularly, the isolated nucleic acid comprises the promoter, coding region and termination regions of the .DELTA.6-desaturase gene. The present invention provides recombinant vectors expressing .DELTA.6-desaturase gene controlled by heterologous regulatory promoter and terminator elements. The nucleic acids and recombinant constructions of the instant invention are useful in the production of GLA in transgenic organisms. | | | | |
| ST | linoleate desaturase cDNA sequence evening primrose; linolenate gamma prodn Oenothera linolenate desaturase gene transgenic plant | | | | |
| IT | Cauliflower mosaic virus (35 S promoter of; cloning of .DELTA.6-desaturase gene from evening primrose and use in .gamma.linolenic acid (GLA) production in transgenic plants) | | | | |
| IT | Promoter (genetic element) RL: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses) (35S, of CaMV; cloning of .DELTA.6-desaturase gene from evening primrose and use in .gamma.linolenic acid (GLA) production in transgenic plants) | | | | |
| IT | Anabaena (carboxylase gene of; cloning of .DELTA.6-desaturase gene from evening primrose and use in .gamma.linolenic acid (GLA) production in transgenic plants) | | | | |
| IT | Genetic engineering Genetic vectors Oenothera Protein sequences Transformation, genetic cDNA sequences (cloning of .DELTA.6-desaturase gene from evening primrose and use in .gamma.linolenic acid (GLA) production in transgenic plants) | | | | |
| IT | Animal cell Embryophyta Eubacteria | | | | |

- Fungi
Plant cell
(expression host; cloning of **.DELTA.6-desaturase** gene from evening primrose and use in .gamma. linolenic acid (GLA) production in transgenic plants)
- IT Gene, plant
RL: AGR (Agricultural use); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
(for **.DELTA.6-desaturase**; cloning of **.DELTA.6-desaturase** gene from evening primrose and use in .gamma. linolenic acid (GLA) production in transgenic plants)
- IT Globulins, biological studies
RL: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses)
(helianthinin, promoter from the gene for; cloning of **.DELTA.6-desaturase** gene from evening primrose and use in .gamma. linolenic acid (GLA) production in transgenic plants)
- IT Albumins, biological studies
RL: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses)
(napins, promoter from the gene for; cloning of **.DELTA.6-desaturase** gene from evening primrose and use in .gamma. linolenic acid (GLA) production in transgenic plants)
- IT Seed
(oilseed, transgenic expression host; cloning of **.DELTA.6-desaturase** gene from evening primrose and use in .gamma. linolenic acid (GLA) production in transgenic plants)
- IT Proteins
RL: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses)
(oleosins, promoter from the gene for; cloning of **.DELTA.6-desaturase** gene from evening primrose and use in .gamma. linolenic acid (GLA) production in transgenic plants)
- IT Glycinins
RL: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses)
(promoter from the gene for; cloning of **.DELTA.6-desaturase** gene from evening primrose and use in .gamma. linolenic acid (GLA) production in transgenic plants)
- IT Promoter (genetic element)
RL: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses)
(seed or tissue-specific, in regulation of **.DELTA.6-desaturase** gene expression; cloning of **.DELTA.6-desaturase** gene from evening primrose and use in .gamma. linolenic acid (GLA) production in transgenic plants)
- IT Seed
Synechocystis
(termination signal specific to; cloning of **.DELTA.6-desaturase** gene from evening primrose and use in .gamma. linolenic acid (GLA) production in transgenic plants)
- IT Genetic element
RL: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses)
(terminator, seed or tissue-specific, in regulation of **.DELTA.6-desaturase** gene expression; cloning of **.DELTA.6-desaturase** gene from evening primrose and use in .gamma. linolenic acid (GLA) production in transgenic plants)

- IT Daucus carota
Nicotiana tabacum
Peanut (Arachis hypogaea)
Rape (plant)
Soybean (Glycine max)
Sunflower
Zea mays
(transgenic expression host; cloning of **.DELTA.6-desaturase** gene from evening primrose and use in **.gamma.** linolenic acid (GLA) production in transgenic plants)
- IT **403776-61-4, Desaturase, linoleate (Oenothera)**
RL: AGR (Agricultural use); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
(amino acid sequence; cloning of **.DELTA.6-desaturase** gene from evening primrose and use in **.gamma.** linolenic acid (GLA) production in transgenic plants)
- IT 506-26-3P, **.gamma.-Linolenic acid**
RL: AGR (Agricultural use); BPN (Biosynthetic preparation); BIOL (Biological study); PREP (Preparation); USES (Uses)
(cloning of **.DELTA.6-desaturase** gene from evening primrose and use in **.gamma.** linolenic acid (GLA) production in transgenic plants)
- IT 25448-06-0P, Octadecatetraenoic acid
RL: AGR (Agricultural use); BPN (Biosynthetic preparation); BYP (Byproduct); BIOL (Biological study); PREP (Preparation); USES (Uses)
(cloning of **.DELTA.6-desaturase** gene from evening primrose and use in **.gamma.** linolenic acid (GLA) production in transgenic plants)
- IT **9082-66-0P, Linoleate desaturase**
RL: AGR (Agricultural use); BPN (Biosynthetic preparation); PRP (Properties); BIOL (Biological study); PREP (Preparation); USES (Uses)
(cloning of **.DELTA.6-desaturase** gene from evening primrose and use in **.gamma.** linolenic acid (GLA) production in transgenic plants)
- IT **403776-60-3**
RL: AGR (Agricultural use); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
(nucleotide sequence; cloning of **.DELTA.6-desaturase** gene from evening primrose and use in **.gamma.** linolenic acid (GLA) production in transgenic plants)
- IT 9031-55-4, Carboxylase
RL: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses)
(of Anabaena, promoter from the gene for; cloning of **.DELTA.6-desaturase** gene from evening primrose and use in **.gamma.** linolenic acid (GLA) production in transgenic plants)
- IT 71245-09-5, Nopaline synthase
RL: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses)
(terminator of the gene for; cloning of **.DELTA.6-desaturase** gene from evening primrose and use in **.gamma.** linolenic acid (GLA) production in transgenic plants)
- IT 403777-67-3, 1: PN: US6355861 SEQID: 1 unclaimed DNA 403777-69-5, 3: PN: US6355861 SEQID: 3 unclaimed DNA 403777-70-8, 4: PN: US6355861 SEQID: 4 unclaimed DNA
RL: PRP (Properties)
(unclaimed nucleotide sequence; cloning of **.DELTA.6-desaturase** gene from evening primrose and its use in **.gamma.** linolenic acid (GLA) production in transgenic plants)

IT 403777-68-4 403777-71-9
 RL: PRP (Properties)
 (unclaimed protein sequence; cloning of **.DELTA.6-desaturase** gene from evening primrose and its use in **.gamma.linolenic acid (GLA) production in transgenic plants**)

IT 253426-99-2 369366-28-9 369366-29-0 403619-87-4 403619-88-5
 403619-89-6 403619-90-9 403619-91-0 403619-92-1 403619-93-2
 403619-94-3 403619-95-4 403619-96-5 403619-97-6 403619-98-7
 403619-99-8 403620-00-8 403620-01-9 403620-02-0 403620-03-1
 403777-72-0 403777-73-1 403777-74-2 403777-75-3 403777-76-4
 403777-77-5 403777-78-6 403777-79-7 403777-80-0 403777-81-1
 403777-82-2
 RL: PRP (Properties)
 (unclaimed sequence; cloning of **.DELTA.6-desaturase** gene from evening primrose and its use in **.gamma.linolenic acid (GLA) production in transgenic plants**)

RE.CNT 1 THERE ARE 1 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE
 (1) Deluca, V; AgBiotech News and Information 1993, V5(6), P225N

IT 403776-61-4, **Desaturase, linoleate (Oenothera)**
 RL: AGR (Agricultural use); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
 (amino acid sequence; cloning of **.DELTA.6-desaturase** gene from evening primrose and use in **.gamma.linolenic acid (GLA) production in transgenic plants**)

IT 9082-66-0P, **Linoleate desaturase**
 RL: AGR (Agricultural use); BPN (Biosynthetic preparation); PRP (Properties); BIOL (Biological study); PREP (Preparation); USES (Uses)
 (cloning of **.DELTA.6-desaturase** gene from evening primrose and use in **.gamma.linolenic acid (GLA) production in transgenic plants**)

IT 403776-60-3
 RL: AGR (Agricultural use); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
 (nucleotide sequence; cloning of **.DELTA.6-desaturase** gene from evening primrose and use in **.gamma.linolenic acid (GLA) production in transgenic plants**)

L41 ANSWER 2 OF 9 HCAPLUS COPYRIGHT 2004 ACS on STN
 AN 1998:682549 HCAPLUS
 DN 129:311742
 ED Entered STN: 28 Oct 1998
 TI The 5'-regulatory region of an Arabidopsis oleosin gene and seed-specific expression of genes for enzymes of lipid metabolism from it
 IN **Thomas, Terry L.**; Li, Zhongsen
 PA **Rhone-Poulenc Agro, Fr.**
 SO PCT Int. Appl., 103 pp.
 CODEN: PIXXD2
 DT Patent
 LA English
 IC ICM C12N015-82
 ICS C12N015-29; C12N015-53; A01H005-00; A01H005-10
 CC 3-5 (Biochemical **Genetics**)
 Section cross-reference(s): 11

FAN.CNT 1

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------------|------|----------|-----------------|--------------|
| WO 9845461 | A1 | 19981015 | WO 1998-US7179 | 19980409 <-- |

W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE,

DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG,
 KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX,
 NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT,
 UA, UG, US, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM
 RW: GH, GM, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES,
 FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI,
 CM, GA, GN, ML, MR, NE, SN, TD, TG

US 5977436 A 19991102 US 1997-831575 19970409 <--

AU 9871071 A1 19981030 AU 1998-71071 19980409 <--

AU 739442 B2 20011011

ZA 9803047 A 19990305 ZA 1998-3047 19980409 <--

EP 973920 A1 20000126 EP 1998-918081 19980409 <--

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, PT, IE, FI

BR 9807969 A 20000308 BR 1998-7969 19980409 <--

JP 2001519668 T2 20011023 JP 1998-543141 19980409 <--

PRAI US 1997-831575 A 19970409 <--

WO 1998-US7179 W 19980409

AB The 5'-regulatory region of an Arabidopsis thaliana oleosin gene is cloned and characterized for use in the seed-specific expression of foreign genes, specifically genes for enzymes of lipid metabolism to alter the seed lipid composition. A cDNA for the seed .DELTA.6 desaturase of borage seed was cloned by gene discovery methods with identity of the cDNA confirmed by expression in tobacco. A cDNA for an A. thaliana oleosin was cloned by differential screening of a seed cDNA library. Expression of the oleosin gene was limited to developing and imbibing seed. The gene was cloned using the cDNA as a probe and the promoter region identified by looking for promoter-specific sequence motifs. Expression of a reporter gene from the oleosin promoter region was limited to green seed and node regions where siliques, cauline leaves, and branches join the inflorescence stem. Some activity was also found in developing seedlings but this was shown to be carry over from dry seed. The induction ratio of the promoter in seed was approx. 210 (highest activity vs. lowest during seed development) and this peak activity was approx. 100-fold greater than that of the cauliflower mosaic virus 35S promoter. Expression of the .DELTA.6 desaturase gene from the oleosin promoter increased the Arabidopsis .gamma.-linolenic acid content to 3.1% of seed C18 fatty acids and increased the content of octadecatetradecaenoic acid to 1.1%.

ST Arabidopsis oleosin gene seed promoter; fatty acid seed oleosin promoter Arabidopsis; lipid synthesis seed oleosin promoter; desaturase gene expression seed oleosin promoter

IT Proteins, specific or class

RL: AGR (Agricultural use); BIOL (Biological study); USES (Uses)
 (ACP (acyl-carrier), seed-specific expression of gene for;
 5'-regulatory region of Arabidopsis oleosin gene and seed-specific
 expression of genes for enzymes of lipid metabolism from it)

IT Fatty acids, biological studies

Lipids, biological studies

RL: AGR (Agricultural use); BOC (Biological occurrence); BSU (Biological study, unclassified); MFM (Metabolic formation); BIOL (Biological study); FORM (Formation, nonpreparative); OCCU (Occurrence); USES (Uses)

(altering seed content of; 5'-regulatory region of Arabidopsis oleosin gene and seed-specific expression of genes for enzymes of lipid metabolism from it)

IT

Corn

Cotton

Peanut (Arachis hypogaea)

Rape (plant)

Soybean (Glycine max)

Sunflower

Tobacco

- (altering seed lipid profile of; 5'-regulatory region of Arabidopsis oleosin gene and seed-specific expression of genes for enzymes of lipid metabolism from it)
- IT Genetic element
 RL: AGR (Agricultural use); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
 (cis regulatory element; 5'-regulatory region of Arabidopsis oleosin gene and seed-specific expression of genes for enzymes of lipid metabolism from it)
- IT **cDNA sequences**
 (for **.DELTA.6 desaturase** of borage;
 5'-regulatory region of Arabidopsis oleosin gene and seed-specific expression of genes for enzymes of lipid metabolism from it)
- IT DNA sequences
 (of promoter of oleosin gene of Arabidopsis; 5'-regulatory region of Arabidopsis oleosin gene and seed-specific expression of genes for enzymes of lipid metabolism from it)
- IT Protein sequences
 (of **.DELTA.6 desaturase** of borage;
 5'-regulatory region of Arabidopsis oleosin gene and seed-specific expression of genes for enzymes of lipid metabolism from it)
- IT Proteins, specific or class
 RL: BSU (Biological study, unclassified); BIOL (Biological study)
 (oleosins, Arabidopsis gene for; 5'-regulatory region of Arabidopsis oleosin gene and seed-specific expression of genes for enzymes of lipid metabolism from it)
- IT Plasmid vectors
 (pAN3, **.DELTA.6 desaturase** gene on,
 seed-specific expression of; 5'-regulatory region of Arabidopsis oleosin gene and seed-specific expression of genes for enzymes of lipid metabolism from it)
- IT Plasmid vectors
 (pAN5, expression vector using oleosin regulatory region; 5'-regulatory region of Arabidopsis oleosin gene and seed-specific expression of genes for enzymes of lipid metabolism from it)
- IT Arabidopsis thaliana
 (promoter of oleosin gene for; 5'-regulatory region of Arabidopsis oleosin gene and seed-specific expression of genes for enzymes of lipid metabolism from it)
- IT Growth and development, plant
 (seed maturation, oleosin gene expression as function of; 5'-regulatory region of Arabidopsis oleosin gene and seed-specific expression of genes for enzymes of lipid metabolism from it)
- IT Seed
 (seed-specific expression of genes for enzymes of lipid metabolism; 5'-regulatory region of Arabidopsis oleosin gene and seed-specific expression of genes for enzymes of lipid metabolism from it)
- IT Borago officinalis
 (**.DELTA.6 desaturase** of; 5'-regulatory region of Arabidopsis oleosin gene and seed-specific expression of genes for enzymes of lipid metabolism from it)
- IT 214605-84-2
 RL: AGR (Agricultural use); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
 (amino acid sequence; 5'-regulatory region of Arabidopsis oleosin gene and seed-specific expression of genes for enzymes of lipid metabolism from it)
- IT 214542-39-9
 RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)

(amino acid sequence; 5'-regulatory region of Arabidopsis oleosin gene and seed-specific expression of genes for enzymes of lipid metabolism from it)

IT 9082-66-0, .DELTA.6 Desaturase

RL: AGR (Agricultural use); PRP (Properties); BIOL (Biological study); USES (Uses)

(cloning of cDNA for, of borage; 5'-regulatory region of Arabidopsis oleosin gene and seed-specific expression of genes for enzymes of lipid metabolism from it)

IT 506-26-3, .gamma.-Linolenic acid 20290-75-9, Stearidonic acid

RL: AGR (Agricultural use); BOC (Biological occurrence); BSU (Biological study, unclassified); MFM (Metabolic formation); BIOL (Biological study); FORM (Formation, nonpreparative); OCCU (Occurrence); USES (Uses)

(increasing seed content of; 5'-regulatory region of Arabidopsis oleosin gene and seed-specific expression of genes for enzymes of lipid metabolism from it)

IT 214542-40-2 214605-83-1

RL: AGR (Agricultural use); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)

(nucleotide sequence; 5'-regulatory region of Arabidopsis oleosin gene and seed-specific expression of genes for enzymes of lipid metabolism from it)

IT 9013-18-7, Fatty acid elongase 9014-34-0, Acyl Coenzyme A desaturase 9023-93-2, Acetyl CoA carboxylase 9077-10-5, .beta.-Ketoacyl synthase 37257-16-2, Acetyltransferase, [acyl carrier protein] 37257-17-3, Malonyl transacylase 58943-36-5, Thioesterase 71427-04-8, .DELTA.15 Desaturase 84628-81-9

RL: AGR (Agricultural use); BIOL (Biological study); USES (Uses)
(seed-specific expression of gene for; 5'-regulatory region of Arabidopsis oleosin gene and seed-specific expression of genes for enzymes of lipid metabolism from it)

RE.CNT 14 THERE ARE 14 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

- (1) Beremand; DISCLOSURE AT THE 12TH INTERNATIONAL SYMPOSIUM ON PLANT LIPIDS 1996
- (2) Beremand, P; PHYSIOL, BIOCHEM MOL BIOL PLANT LIPIDS, (PROC INT SYMP PLANT LIPIDS), 12TH 1997, P351 HCAPLUS
- (3) Du Pont; WO 9311245 A 1993 HCAPLUS
- (4) Du Pont; WO 9411516 A 1994 HCAPLUS
- (5) Du Pont; WO 9606936 A 1996 HCAPLUS
- (6) Gibson, S; PLANT PHYSIOLOGY 1994, V106, P1615 HCAPLUS
- (7) Hawkin; WO 9623892 A 1996 HCAPLUS
- (8) Kirik, V; PLANT MOLECULAR BIOLOGY 1996, V31, P413 HCAPLUS
- (9) Kishore, G; WO 9418337 A 1994 HCAPLUS
- (10) LI, Z; ISOLATION AND CHARACTERIZATION OF ARABIDOPSIS EMBRYO-SPECIFIC GENES (VIRTUAL SUBTRACTION, DNA BINDING SITES, GENE ISOLATION) 1997, P107 HCAPLUS
- (11) Moloney, M; WO 9320216 A 1993 HCAPLUS
- (12) Plant, A; PLANT MOLECULAR BIOLOGY 1994, V25, P193 HCAPLUS
- (13) Rhone Poulenc Agrochimie; WO 9621022 A 1996 HCAPLUS
- (14) Toepfer, R; SCIENCE 1995, V268, P681 HCAPLUS

IT 9082-66-0, .DELTA.6 Desaturase

RL: AGR (Agricultural use); PRP (Properties); BIOL (Biological study); USES (Uses)

(cloning of cDNA for, of borage; 5'-regulatory region of Arabidopsis oleosin gene and seed-specific expression of genes for enzymes of lipid metabolism from it)

IT 214605-83-1

RL: AGR (Agricultural use); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)

(nucleotide sequence; 5'-regulatory region of Arabidopsis oleosin gene

and seed-specific expression of genes for enzymes of lipid metabolism from it)

L41 ANSWER 3 OF 9 HCAPLUS COPYRIGHT 2004 ACS on STN
 AN 1998:682548 HCAPLUS
 DN 129:311741
 ED Entered STN: 28 Oct 1998
 TI A sunflower 2 S albumin 5'-regulatory region and its use in modification of plant seed lipid composition
 IN **Thomas, Terry L.**; Beremand, Phillip D.; Nunberg, Andrew N.
 PA **Rhone-Poulenc** Agro, Fr.
 SO PCT Int. Appl., 68 pp.
 CODEN: PIXXD2
 DT Patent
 LA English
 IC ICM C12N015-82
 ICS C12N015-29; C12N015-53; A01H005-00; A01H005-10
 CC 3-5 (Biochemical **Genetics**)
 Section cross-reference(s): 11

FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|----------------|------|--------------|--|--------------|
| PI | WO 9845460 | A1 | 19981015 | WO 1998-US7178 | 19980409 <-- |
| | W: | | | AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM | |
| | RW: | | | GH, GM, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG | |
| | US 5959175 | A | 19990928 | US 1997-831570 | 19970409 <-- |
| | AU 9869634 | A1 | 19981030 | AU 1998-69634 | 19980409 <-- |
| | ZA 9803039 | A | 19990305 | ZA 1998-3039 | 19980409 <-- |
| | BR 9807966 | A | 20000308 | BR 1998-7966 | 19980409 <-- |
| | EP 1007710 | A1 | 20000614 | EP 1998-915454 | 19980409 <-- |
| | R: | | | AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, PT, IE, FI | |
| | JP 2001518795 | T2 | 20011016 | JP 1998-543140 | 19980409 <-- |
| PRAI | US 1997-831570 | A | 19970409 <-- | | |
| | WO 1998-US7178 | W | 19980409 | | |

AB The 5' regulatory regions of a sunflower 2 S albumin gene is characterized for use in high-level, seed-specific expression of foreign genes in plants. In particular, the region may be used to drive sense or antisense expression of genes involved in fatty acid synthesis or lipid metabolism to alter the lipid composition of seed. A cDNA for the .DELTA.6 desaturase of borage was cloned by screening a bank of abundant seed polysomal RNAs against public sequence databases. A cDNA encoding motifs typical of membrane-bound desaturases was identified and the identity of the gene product was confirmed by expression. A cDNA for the albumin was cloned by differential screening of sunflower seed banks and a partial cDNA used as a probe to identify the gene. Expression of the .DELTA.6 desaturase gene from the sunflower promoter in Arabidopsis resulted in the accumulation of .gamma.-linolenic acid and octadecatetraenoic acid in seed at 4.4. and 1.7% of seed C18 fatty acids resp. Expression was sharply limited to seed with neither of these acids detectable in leaf when the gene was expressed from this promoter. Expression of the desaturase cDNA from a 35S promoter led to significant accumulation of .gamma.-linolenic acid in leaves.

ST albumin promoter sunflower seed gene expression; desaturase cDNA borage cloning expression; fatty acid seed desaturase gene expression

IT Albumins, biological studies

- RL: AGR (Agricultural use); BSU (Biological study, unclassified); BIOL (Biological study); USES (Uses)
 (2 S, 5'-regulatory region of gene for; sunflower 2 S albumin 5'-regulatory region and its use in modification of plant seed lipid composition)
- IT Proteins, specific or class
 RL: AGR (Agricultural use); BSU (Biological study, unclassified); MFM (Metabolic formation); BIOL (Biological study); FORM (Formation, nonpreparative); USES (Uses)
 (ACP (acyl-carrier), seed-specific expression of gene for; sunflower 2 S albumin 5'-regulatory region and its use in modification of plant seed lipid composition)
- IT Genetic element
 RL: BSU (Biological study, unclassified); BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses)
 (cis regulatory element; sunflower 2 S albumin 5'-regulatory region and its use in modification of plant seed lipid composition)
- IT Arabidopsis thaliana
 Corn
 Cotton
 Peanut (Arachis hypogaea)
 Rape (plant)
 Soybean (Glycine max)
 Tobacco
 (expression of genes of lipid metabolism in; sunflower 2 S albumin 5'-regulatory region and its use in modification of plant seed lipid composition)
- IT Gene, plant
 RL: AGR (Agricultural use); PRP (Properties); BIOL (Biological study); USES (Uses)
 (for **.DELTA.6 desaturase** of borage, expression in sunflower of; sunflower 2 S albumin 5'-regulatory region and its use in modification of plant seed lipid composition)
- IT **cDNA sequences**
 (for **.DELTA.6-desaturase** of borage; sunflower 2 S albumin 5'-regulatory region and its use in modification of plant seed lipid composition)
- IT Seed
 (lipid composition of, tissue-specific expression of foreign genes in; sunflower 2 S albumin 5'-regulatory region and its use in modification of plant seed lipid composition)
- IT DNA sequences
 (of 2 S albumin gene promoter of sunflower; sunflower 2 S albumin 5'-regulatory region and its use in modification of plant seed lipid composition)
- IT **Genetic engineering**
 (of plant seed lipid profiles; sunflower 2 S albumin 5'-regulatory region and its use in modification of plant seed lipid composition)
- IT Protein sequences
 (of **.DELTA.6-desaturase** of borage; sunflower 2 S albumin 5'-regulatory region and its use in modification of plant seed lipid composition)
- IT Plasmid vectors
 (pAN2, cDNA for **.DELTA.6-desaturase** of borage on; sunflower 2 S albumin 5'-regulatory region and its use in modification of plant seed lipid composition)
- IT Plasmid vectors
 (pAN4, cDNA for **.DELTA.6-desaturase** of borage on, expression from sunflower albumin promoter of; sunflower 2 S albumin 5'-regulatory region and its use in modification of plant seed

- lipid composition)
- IT Fatty acids, biological studies
Lipids, biological studies
RL: AGR (Agricultural use); BSU (Biological study, unclassified); MFM (Metabolic formation); BIOL (Biological study); FORM (Formation, nonpreparative); USES (Uses)
(seed-specific expression of genes for biosynthesis of; sunflower 2 S albumin 5'-regulatory region and its use in modification of plant seed lipid composition)
- IT Sunflower
(sunflower 2 S albumin 5'-regulatory region and its use in modification of plant seed lipid composition)
- IT Borago officinalis
(**.DELTA.6 desaturase** of; sunflower 2 S albumin 5'-regulatory region and its use in modification of plant seed lipid composition)
- IT 214605-84-2
RL: AGR (Agricultural use); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
(amino acid sequence; sunflower 2 S albumin 5'-regulatory region and its use in modification of plant seed lipid composition)
- IT **9082-66-0, .DELTA.6 Desaturase**
RL: AGR (Agricultural use); PRP (Properties); BIOL (Biological study); USES (Uses)
(borage gene for, expression in sunflower of; sunflower 2 S albumin 5'-regulatory region and its use in modification of plant seed lipid composition)
- IT 9013-18-7, Fatty acid elongase 9023-93-2, Acetyl CoA carboxylase 9029-97-4, Thiolase I 37257-16-2, Acetyltransferase, [acyl carrier protein] 37257-17-3, Malonyl transacylase 58943-36-5, Thioesterase 71427-04-8, **.DELTA.15 Desaturase** 84628-81-9 103843-28-3, Desaturase
RL: AGR (Agricultural use); BSU (Biological study, unclassified); BIOL (Biological study); USES (Uses)
(gene for, seed-specific expression of; sunflower 2 S albumin 5'-regulatory region and its use in modification of plant seed lipid composition)
- IT 506-26-3, **.gamma.-Linolenic acid** 20290-75-9, Stearidonic acid
RL: BOC (Biological occurrence); BSU (Biological study, unclassified); MFM (Metabolic formation); BIOL (Biological study); FORM (Formation, nonpreparative); OCCU (Occurrence)
(in tobacco expressing borage **.DELTA.6 desaturase** gene; sunflower 2 S albumin 5'-regulatory region and its use in modification of plant seed lipid composition)
- IT **214605-83-1**
RL: AGR (Agricultural use); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
(nucleotide sequence, expression in sunflower of; sunflower 2 S albumin 5'-regulatory region and its use in modification of plant seed lipid composition)
- IT 214542-17-3
RL: AGR (Agricultural use); PRP (Properties); BIOL (Biological study); USES (Uses)
(nucleotide sequence, expression of foreign genes from; sunflower 2 S albumin 5'-regulatory region and its use in modification of plant seed lipid composition)
- RE.CNT 14 THERE ARE 14 CITED REFERENCES AVAILABLE FOR THIS RECORD
- RE
- (1) Allen, R; MOL GEN GENET 1987, V210, P211 HCAPLUS
- (2) Beremand, P; DISCLOSURE AT THE 12TH INTERNATIONAL SYMPOSIUM ON PLANT LIPIDS 1996

- (3) Beremand, P; PHYSIOL, BIOCHEM MOL BIOL PLANT LIPIDS, [PROC INT SYMP PLANT LIPIDS], 12TH 1997, P351 HCAPLUS
- (4) Calgene Inc; WO 9113972 A 1991 HCAPLUS
- (5) Calgene Inc; WO 9410189 A 1994 HCAPLUS
- (6) Du Pont; WO 9211373 A 1992 HCAPLUS
- (7) Du Pont; WO 9311245 A 1993 HCAPLUS
- (8) Du Pont; WO 9411516 A 1994 HCAPLUS
- (9) Du Pont; WO 9606936 A 1996 HCAPLUS
- (10) Gibson, S; PLANT PHYSIOLOGY 1994, V104, P1615
- (11) Monsanto Co; WO 9418337 A 1994 HCAPLUS
- (12) Rhone Poulenc Agrochimie; WO 9217580 A 1992 HCAPLUS
- (13) Rhone Poulenc Agrochimie; WO 9621022 A 1996 HCAPLUS
- (14) Toepfer, R; SCIENCE 1995, V268, P681 HCAPLUS
- IT **9082-66-0, .DELTA.6 Desaturase**
 RL: AGR (Agricultural use); PRP (Properties); BIOL (Biological study);
 USES (Uses)
 (borage gene for, expression in sunflower of; sunflower 2 S albumin
 5'-regulatory region and its use in modification of plant seed lipid
 composition)
- IT **214605-83-1**
 RL: AGR (Agricultural use); BSU (Biological study, unclassified); PRP
 (Properties); BIOL (Biological study); USES (Uses)
 (nucleotide sequence, expression in sunflower of; sunflower 2 S albumin
 5'-regulatory region and its use in modification of plant seed lipid
 composition)
- L41 ANSWER 4 OF 9 HCAPLUS COPYRIGHT 2004 ACS on STN
- AN 1997:607454 HCAPLUS
- DN 127:290630
- ED Entered STN: 24 Sep 1997
- TI Production of .gamma.-linolenic acid by transgenic plants expressing
 cyanobacterial or plant **.DELTA.6-desaturase**
 genes
- AU Beremand, Phillip D.; Nunberg, Andrew N.; Reddy, Avutu S.; **Thomas,**
Terry L.
- CS Dep. Biology, Texas A&M Univ., College Station, TX, 77843, USA
- SO Physiology, Biochemistry and Molecular Biology of Plant Lipids,
 [Proceedings of the International Symposium on Plant Lipids], 12th.
 Toronto, July 7-12, 1996 (1997), 351-353. Editor(s): Williams,
 John Peter; Khan, Mobashsher Uddin; Lem, Nora Wan. Publisher: Kluwer,
 Dordrecht, Neth.
 CODEN: 65BHAZ
- DT Conference
- LA English
- CC 11-2 (Plant Biochemistry)
 Section cross-reference(s): 3
- AB **.DELTA.6-Desaturase** genes were isolated from cyanobacteria and *Borago*
officinalis. Introduction of these genes into tobacco under the control
 of the cauliflower mosaic virus 35S promoter resulted in .gamma.-linolenic
 acid (GLA) production in leaf lipids. The use of seed specific promoters also
 resulted in significant levels of GLA in seed lipids.
- ST linolenic acid transgenic tobacco desaturase gene
- IT Gene
 (expression; production of .gamma.-linolenic acid by transgenic tobacco
 expressing cyanobacterial or plant **.DELTA.6-**
desaturase genes)
- IT *Borago officinalis*
Synechocystis
 Tobacco
 Transformation, genetic

(production of .gamma.-linolenic acid by transgenic tobacco expressing cyanobacterial or plant **.DELTA.6-desaturase** genes)

IT 81275-46-9, Octadecatetraenoic acid
 RL: BSU (Biological study, unclassified); MFM (Metabolic formation); BIOL (Biological study); FORM (Formation, nonpreparative)
 (production by transgenic tobacco expressing cyanobacterial or plant **.DELTA.6-desaturase** genes)

IT 9082-66-0, **.DELTA.6-Desaturase**
 RL: BSU (Biological study, unclassified); BIOL (Biological study)
 (production of .gamma.-linolenic acid by transgenic tobacco expressing cyanobacterial or plant **.DELTA.6-desaturase** genes)

IT 506-26-3, .gamma.-Linolenic acid
 RL: BSU (Biological study, unclassified); MFM (Metabolic formation); BIOL (Biological study); FORM (Formation, nonpreparative)
 (production of .gamma.-linolenic acid by transgenic tobacco expressing cyanobacterial or plant **.DELTA.6-desaturase** genes)

IT 9082-66-0, **.DELTA.6-Desaturase**
 RL: BSU (Biological study, unclassified); BIOL (Biological study)
 (production of .gamma.-linolenic acid by transgenic tobacco expressing cyanobacterial or plant **.DELTA.6-desaturase** genes)

L41 ANSWER 5 OF 9 HCAPLUS COPYRIGHT 2004 ACS on STN
 AN 1997:231335 HCAPLUS
 DN 126:289996
 ED Entered STN: 10 Apr 1997
 TI Microbial and plant genes for **.DELTA.6-desaturases** and their use in increasing tissue levels of .gamma.-linolenic acid
 IN **Thomas, Terry L.**; Reddy, Avutu S.; Nuccio, Michael; Nunberg, Andrew N.; Freyssinet, Georges L.
 PA **Rhone-Poulenc** Agrochimie, Fr.
 SO U.S., 30 pp., Cont.-in-part of U.S. 5,552,306.
 CODEN: USXXAM
 DT Patent
 LA English
 IC ICM C12N015-53
 ICS C12N015-82; C12N001-21; C12P007-64
 NCL 435134000
 CC 7-2 (Enzymes)
 FAN.CNT 4

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|----|--|------|----------|-----------------|--------------|
| PI | US 5614393 | A | 19970325 | US 1994-366779 | 19941230 <-- |
| | ZA 9207777 | A | 19930421 | ZA 1992-7777 | 19921009 <-- |
| | US 5552306 | A | 19960903 | US 1994-307382 | 19940914 <-- |
| | US 5663068 | A | 19970902 | US 1995-478727 | 19950607 <-- |
| | US 5689050 | A | 19971118 | US 1995-473508 | 19950607 <-- |
| | CA 2207906 | AA | 19960711 | CA 1995-2207906 | 19951228 <-- |
| | WO 9621022 | A2 | 19960711 | WO 1995-IB1167 | 19951228 <-- |
| | WO 9621022 | A3 | 19960912 | | |
| | W: AU, BR, CA, CN, JP, RO, RU, UA | | | | |
| | RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE | | | | |
| | AU 9646735 | A1 | 19960724 | AU 1996-46735 | 19951228 <-- |
| | AU 707061 | B2 | 19990701 | | |
| | EP 801680 | A2 | 19971022 | EP 1995-944464 | 19951228 <-- |
| | R: DE, ES, FR, GB, GR, IT | | | | |

| | | | | | |
|------|---|----|----------|----------------|--------------|
| | CN 1177379 | A | 19980325 | CN 1995-197728 | 19951228 <-- |
| | CN 1117864 | B | 20030813 | | |
| | BR 9510411 | A | 19980519 | BR 1995-10411 | 19951228 <-- |
| | JP 10511848 | T2 | 19981117 | JP 1995-520827 | 19951228 <-- |
| | RU 2181772 | C2 | 20020427 | RU 1997-112919 | 19951228 <-- |
| | US 5789220 | A | 19980804 | US 1997-789936 | 19970128 <-- |
| PRAI | US 1991-774475 | B2 | 19911010 | <-- | |
| | US 1992-817919 | B2 | 19920108 | <-- | |
| | US 1992-959952 | B1 | 19921013 | <-- | |
| | US 1994-307382 | A2 | 19940914 | <-- | |
| | US 1994-366779 | A | 19941230 | <-- | |
| | WO 1995-IB1167 | W | 19951228 | <-- | |
| AB | Microbial genes for .DELTA.6-desaturases are cloned and characterized for use in the preparation of transgenic organisms synthesizing high levels of .gamma.-linolenic acid from linoleic acid. Plants expressing a desaturase gene and with high tissue levels of .gamma.-linolenic acid are chilling resistant. These plants can also be used to produce oils with altered levels .gamma.-linolenic acid. The Synechocystis .DELTA.6-desaturase was cloned by expression in a .gamma.-linolenate-deficient Anabaena. Expression of the gene in transgenic tobacco and carrot is demonstrated. | | | | |
| ST | delta6 desaturase gene Synechocystis borage; gamma linolenate manuf delta6 desaturase | | | | |
| IT | Plasmid vectors (121.1.DELTA.6NOS, borage .DELTA.6-desaturase gene on, expression in carrot cell culture and tobacco of; microbial and plant genes for .DELTA.6-desaturases and their use in increasing tissue levels of .gamma.-linolenic acid) | | | | |
| IT | Plasmid vectors (221..DELTA.6NOS, borage .DELTA.6-desaturase gene on, expression in carrot cell culture and tobacco of; microbial and plant genes for .DELTA.6-desaturases and their use in increasing tissue levels of .gamma.-linolenic acid) | | | | |
| IT | Promoter (genetic element) RL: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses) (35S, expression of .DELTA.6-desaturase genes from; microbial and plant genes for .DELTA.6-desaturases and their use in increasing tissue levels of .gamma.-linolenic acid) | | | | |
| IT | Carrot (cell cultures as expression host; microbial and plant genes for .DELTA.6-desaturases and their use in increasing tissue levels of .gamma.-linolenic acid) | | | | |
| IT | Stress, plant (cold, transgenic plants resistant to; microbial and plant genes for .DELTA.6-desaturases and their use in increasing tissue levels of .gamma.-linolenic acid) | | | | |
| IT | Corn Filamentous fungi Peanut (Arachis hypogaea) Rape (plant) Soybean (Glycine max) Sunflower Tobacco (expression host; microbial and plant genes for .DELTA.6-desaturases and their use in increasing tissue levels of .gamma.-linolenic acid) | | | | |
| IT | Anabaena | | | | |

- (expression of **.DELTA.6-desaturase** genes from carboxylase promoter of; microbial and plant genes for **.DELTA.6-desaturases** and their use in increasing tissue levels of **.gamma.-linolenic acid**)
- IT Glycinins
RL: MSC (Miscellaneous)
(expression of **.DELTA.6-desaturase** genes from promoter of gene for; microbial and plant genes for **.DELTA.6-desaturases** and their use in increasing tissue levels of **.gamma.-linolenic acid**)
- IT DNA sequences
(for **.DELTA.6-desaturase** of *Synechocystis*; microbial and plant genes for **.DELTA.6-desaturases** and their use in increasing tissue levels of **.gamma.-linolenic acid**)
- IT cDNA sequences
(for **.DELTA.6-desaturase** of borage; microbial and plant genes for **.DELTA.6-desaturases** and their use in increasing tissue levels of **.gamma.-linolenic acid**)
- IT Gene, microbial
Gene, plant
RL: BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
(for **.DELTA.6-desaturase**, cloning and expression of; microbial and plant genes for **.DELTA.6-desaturases** and their use in increasing tissue levels of **.gamma.-linolenic acid**)
- IT Globulins, miscellaneous
RL: MSC (Miscellaneous)
(helianthinins, expression of **.DELTA.6-desaturase** genes from promoter of gene for; microbial and plant genes for **.DELTA.6-desaturases** and their use in increasing tissue levels of **.gamma.-linolenic acid**)
- IT Globulins, miscellaneous
RL: MSC (Miscellaneous)
(helianthins, expression of **.DELTA.6-desaturase** genes from promoter of gene for; microbial and plant genes for **.DELTA.6-desaturases** and their use in increasing tissue levels of **.gamma.-linolenic acid**)
- IT Promoter (genetic element)
RL: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses)
(homologous and heterologous, expression of **.DELTA.6-desaturase** genes from; microbial and plant genes for **.DELTA.6-desaturases** and their use in increasing tissue levels of **.gamma.-linolenic acid**)
- IT Albumins, miscellaneous
RL: MSC (Miscellaneous)
(napins, expression of **.DELTA.6-desaturase** genes from promoter of gene for; microbial and plant genes for **.DELTA.6-desaturases** and their use in increasing tissue levels of **.gamma.-linolenic acid**)
- IT Protein sequences
(of **.DELTA.6-desaturases** of *Synechocystis* and borage; microbial and plant genes for **.DELTA.6-desaturases** and their use in increasing tissue levels of **.gamma.-linolenic acid**)
- IT *Borago officinalis*
Synechocystis

- (**.DELTA.6-desaturase** gene of; microbial and plant genes for **.DELTA.6-desaturases** and their use in increasing tissue levels of **.gamma.-linolenic acid**)
- IT 148734-39-8 180583-92-0, **Desaturase, linoleate** (Borago officinalis)
 RL: AGR (Agricultural use); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
 (amino acid sequence; microbial and plant genes for **.DELTA.6-desaturases** and their use in increasing tissue levels of **.gamma.-linolenic acid**)
- IT 9031-55-4, Carboxylase
 RL: MSC (Miscellaneous)
 (expression of **.DELTA.6-desaturase** genes from Anabena promoter of gene for; microbial and plant genes for **.DELTA.6-desaturases** and their use in increasing tissue levels of **.gamma.-linolenic acid**)
- IT 71427-04-8P, **.DELTA.15-Desaturase** 84628-81-9P
 RL: AGR (Agricultural use); BPN (Biosynthetic preparation); PRP (Properties); BIOL (Biological study); PREP (Preparation); USES (Uses)
 (gene for, in engineering fatty acid profiles; microbial and plant genes for **.DELTA.6-desaturases** and their use in increasing tissue levels of **.gamma.-linolenic acid**)
- IT 81275-46-9P, Octadecatetraenoic acid
 RL: BPN (Biosynthetic preparation); BIOL (Biological study); PREP (Preparation)
 (manufacture with transgenic microorganisms, **.DELTA.6-desaturase** genes in; microbial and plant genes for **.DELTA.6-desaturases** and their use in increasing tissue levels of **.gamma.-linolenic acid**)
- IT 9082-66-0P, **.DELTA.6-Desaturase**
 RL: AGR (Agricultural use); BPN (Biosynthetic preparation); PRP (Properties); BIOL (Biological study); PREP (Preparation); USES (Uses)
 (microbial and plant genes for **.DELTA.6-desaturases** and their use in increasing tissue levels of **.gamma.-linolenic acid**)
- IT 463-40-1, **.alpha.-Linolenic acid**
 RL: BSU (Biological study, unclassified); BIOL (Biological study)
 (microorganisms producing, manufacture of **.gamma.-linolenate** with; microbial and plant genes for **.DELTA.6-desaturases** and their use in increasing tissue levels of **.gamma.-linolenic acid**)
- IT 180583-90-8 180583-91-9 182083-61-0
 RL: AGR (Agricultural use); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
 (nucleotide sequence; microbial and plant genes for **.DELTA.6-desaturases** and their use in increasing tissue levels of **.gamma.-linolenic acid**)
- IT 506-26-3P, **.gamma.-Linolenic acid**
 RL: AGR (Agricultural use); BPN (Biosynthetic preparation); BIOL (Biological study); PREP (Preparation); USES (Uses)
 (preparation from linoleic acid of; microbial and plant genes for **.DELTA.6-desaturases** and their use in increasing tissue levels of **.gamma.-linolenic acid**)
- IT 60-33-3, 9,12-Octadecadienoic acid (Z,Z)-, reactions
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (**.gamma.-linolenic acid** preparation from; microbial and plant genes for **.DELTA.6-desaturases** and their use in increasing tissue levels of **.gamma.-linolenic acid**)
- IT 9082-66-0P, **.DELTA.6-Desaturase**
 RL: AGR (Agricultural use); BPN (Biosynthetic preparation); PRP (Properties); BIOL (Biological study); PREP (Preparation); USES (Uses)

(microbial and plant genes for **.DELTA.6-desaturases** and their use in increasing tissue levels of .gamma.-linolenic acid)

IT 180583-90-8 180583-91-9 182083-61-0

RL: AGR (Agricultural use); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
(nucleotide sequence; microbial and plant genes for **.DELTA.6-desaturases** and their use in increasing tissue levels of .gamma.-linolenic acid)

L41 ANSWER 6 OF 9 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1996:531817 HCAPLUS

DN 125:160370

ED Entered STN: 06 Sep 1996

TI **Borago officinalis .DELTA.6-**

desaturase cDNA sequence, .gamma.-linolenic acid production by transgenic plant, and improved resistance to chilling

IN **Thomas, Terry L.**; Reddy, Avutu S.; Nuccio, Michael; Nunberg, Andrew N.; Freyssinet, Georges L.

PA **Rhone-Poulenc** Agrochimie, Fr.

SO PCT Int. Appl., 64 pp.

CODEN: PIXXD2

DT Patent

LA English

IC ICM C12N015-53

ICS C12N015-82; A01H005-00

CC 3-2 (Biochemical **Genetics**)

Section cross-reference(s): 7, 10, 11, 17

FAN.CNT 4

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|--|------|----------|-----------------|--------------|
| PI | WO 9621022 | A2 | 19960711 | WO 1995-IB1167 | 19951228 <-- |
| | WO 9621022 | A3 | 19960912 | | |
| | W: AU, BR, CA, CN, JP, RO, RU, UA | | | | |
| | RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE | | | | |
| | US 5614393 | A | 19970325 | US 1994-366779 | 19941230 <-- |
| | AU 9646735 | A1 | 19960724 | AU 1996-46735 | 19951228 <-- |
| | AU 707061 | B2 | 19990701 | | |
| | EP 801680 | A2 | 19971022 | EP 1995-944464 | 19951228 <-- |
| | R: DE, ES, FR, GB, GR, IT | | | | |
| | BR 9510411 | A | 19980519 | BR 1995-10411 | 19951228 <-- |
| | JP 10511848 | T2 | 19981117 | JP 1995-520827 | 19951228 <-- |
| | RU 2181772 | C2 | 20020427 | RU 1997-112919 | 19951228 <-- |
| PRAI | US 1994-366779 | A | 19941230 | <-- | |
| | US 1991-774475 | B2 | 19911010 | <-- | |
| | US 1992-817919 | B2 | 19920108 | <-- | |
| | US 1992-959952 | B1 | 19921013 | <-- | |
| | US 1994-307382 | A2 | 19940914 | <-- | |
| | WO 1995-IB1167 | W | 19951228 | <-- | |

AB Linoleic acid is converted into .gamma.-linolenic acid (GLA) by the enzyme **.DELTA.6-desaturase**. The present invention is directed to isolated nucleic acids comprising the **.DELTA.6-desaturase** gene. More particularly, the isolated nucleic acid comprises the promoter, coding region and termination regions of the **.DELTA.6-desaturase** gene. The present invention provides recombinant constructions comprising the **.DELTA.6-desaturase** coding region in functional combination with heterologous regulatory sequences. The nucleic acids and recombinant constructions of the instant invention are useful in the production of GLA in transgenic organisms.

ST **linoleate desaturase** gamma linolenate prodn borage;

- cDNA sequence DELTA6 desaturase Borago; desaturase DELTA6 gamma linolenate
prodn Borago; plant transgenic expression borage DELTA6 desaturase
- IT Borago officinalis
Deoxyribonucleic acid sequences
 Genetic engineering
 Genetic vectors
 Protein sequences
 (Borago officinalis **.DELTA.6-desaturase**
 cDNA sequence, .gamma.-linolenic acid production by transgenic plant, and
 improved resistance to chilling)
- IT Gene, microbial
RL: AGR (Agricultural use); BPR (Biological process); BSU (Biological
study, unclassified); BUU (Biological use, unclassified); PRP
(Properties); BIOL (Biological study); PROC (Process); USES (Uses)
 (Borago officinalis **.DELTA.6-desaturase**
 cDNA sequence, .gamma.-linolenic acid production by transgenic plant, and
 improved resistance to chilling)
- IT Anabaena
 (carboxylase promoter; Borago officinalis **.DELTA.6-**
 desaturase cDNA sequence, .gamma.-linolenic acid production by
 transgenic plant, and improved resistance to chilling)
- IT Animal cell
 Bacteria
 Fungi
 Plant
 Plant cell
 (expression host; Borago officinalis **.DELTA.6-**
 desaturase cDNA sequence, .gamma.-linolenic acid production by
 transgenic plant, and improved resistance to chilling)
- IT Glycinins
RL: BSU (Biological study, unclassified); BIOL (Biological study)
 (promoter; Borago officinalis **.DELTA.6-**
 desaturase cDNA sequence, .gamma.-linolenic acid production by
 transgenic plant, and improved resistance to chilling)
- IT Seed
 Synechocystis
 (termination signal; Borago officinalis **.DELTA.6-**
 desaturase cDNA sequence, .gamma.-linolenic acid production by
 transgenic plant, and improved resistance to chilling)
- IT Carrot
 Corn
 Peanut
 Rape (plant)
 Soybean
 Sunflower
 Tobacco
 (transgenic expression host; Borago officinalis **.DELTA.**
 6-desaturase cDNA sequence, .gamma.-linolenic acid
 production by transgenic plant, and improved resistance to chilling)
- IT Virus, plant
 (cauliflower mosaic, CaMV 35 S promoter; Borago officinalis
 .DELTA.6-desaturase cDNA sequence,
 .gamma.-linolenic acid production by transgenic plant, and improved
 resistance to chilling)
- IT Plant stress
 (cold, Borago officinalis **.DELTA.6-**
 desaturase cDNA sequence, .gamma.-linolenic acid production by
 transgenic plant, and improved resistance to chilling)
- IT Globulins, biological studies
RL: BSU (Biological study, unclassified); BIOL (Biological study)

- (helianthinins, promoter; *Borago officinalis* **.DELTA.6-desaturase** cDNA sequence, .gamma.-linolenic acid production by transgenic plant, and improved resistance to chilling)
- IT Albumins, biological studies
 RL: BSU (Biological study, unclassified); BIOL (Biological study) (napins, promoter; *Borago officinalis* **.DELTA.6-desaturase** cDNA sequence, .gamma.-linolenic acid production by transgenic plant, and improved resistance to chilling)
- IT Seed
 (oil-, transgenic expression host; *Borago officinalis* **.DELTA.6-desaturase** cDNA sequence, .gamma.-linolenic acid production by transgenic plant, and improved resistance to chilling)
- IT Plasmid and Episome
 (pBI121, *Borago officinalis* **.DELTA.6-desaturase** cDNA sequence, .gamma.-linolenic acid production by transgenic plant, and improved resistance to chilling)
- IT Plasmid and Episome
 (pBI221, *Borago officinalis* **.DELTA.6-desaturase** cDNA sequence, .gamma.-linolenic acid production by transgenic plant, and improved resistance to chilling)
- IT Genetic element
 RL: AGR (Agricultural use); BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses) (promoter, *Borago officinalis* **.DELTA.6-desaturase** cDNA sequence, .gamma.-linolenic acid production by transgenic plant, and improved resistance to chilling)
- IT Genetic element
 RL: BSU (Biological study, unclassified); BIOL (Biological study) (promoter, 35S, CaMV 35 S promoter; *Borago officinalis* **.DELTA.6-desaturase** cDNA sequence, .gamma.-linolenic acid production by transgenic plant, and improved resistance to chilling)
- IT Genetic element
 RL: AGR (Agricultural use); BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses) (terminator, *Borago officinalis* **.DELTA.6-desaturase** cDNA sequence, .gamma.-linolenic acid production by transgenic plant, and improved resistance to chilling)
- IT Transformation, genetic
 (transgenic, *Borago officinalis* **.DELTA.6-desaturase** cDNA sequence, .gamma.-linolenic acid production by transgenic plant, and improved resistance to chilling)
- IT 9031-55-4, Carboxylase
 RL: BSU (Biological study, unclassified); BIOL (Biological study) (*Anabaena* carboxylase promoter; *Borago officinalis* **.DELTA.6-desaturase** cDNA sequence, .gamma.-linolenic acid production by transgenic plant, and improved resistance to chilling)
- IT 506-26-3P, .gamma.-Linolenic acid
 RL: AGR (Agricultural use); BOC (Biological occurrence); BPN (Biosynthetic preparation); BSU (Biological study, unclassified); BIOL (Biological study); OCCU (Occurrence); PREP (Preparation); USES (Uses) (*Borago officinalis* **.DELTA.6-desaturase** cDNA sequence, .gamma.-linolenic acid production by transgenic plant, and improved resistance to chilling)
- IT 25448-06-0P, Octadecatetraenoic acid
 RL: AGR (Agricultural use); BPN (Biosynthetic preparation); BIOL (Biological study); PREP (Preparation); USES (Uses) (*Borago officinalis* **.DELTA.6-desaturase** cDNA sequence, .gamma.-linolenic acid production by transgenic plant, and improved resistance to chilling)
- IT 9082-66-0P, Linoleate desaturase

RL: AGR (Agricultural use); BPN (Biosynthetic preparation); PRP (Properties); BIOL (Biological study); PREP (Preparation); USES (Uses)
 (Borago officinalis **.DELTA.6-desaturase** cDNA sequence, .gamma.-linolenic acid production by transgenic plant, and improved resistance to chilling)

IT 180583-92-0P
 RL: AGR (Agricultural use); BPN (Biosynthetic preparation); PRP (Properties); BIOL (Biological study); PREP (Preparation); USES (Uses)
 (amino acid sequence; Borago officinalis **.DELTA.6-desaturase** cDNA sequence, .gamma.-linolenic acid production by transgenic plant, and improved resistance to chilling)

IT 180583-90-8 180583-91-9
 RL: AGR (Agricultural use); BPR (Biological process); BSU (Biological study, unclassified); BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); PROC (Process); USES (Uses)
 (nucleotide sequence; Borago officinalis **.DELTA.6-desaturase** cDNA sequence, .gamma.-linolenic acid production by transgenic plant, and improved resistance to chilling)

IT 71245-09-5, Nopaline synthase
 RL: BSU (Biological study, unclassified); BIOL (Biological study) (termination signal; Borago officinalis **.DELTA.6-desaturase** cDNA sequence, .gamma.-linolenic acid production by transgenic plant, and improved resistance to chilling)

IT 9082-66-0P, **Linoleate desaturase**
 RL: AGR (Agricultural use); BPN (Biosynthetic preparation); PRP (Properties); BIOL (Biological study); PREP (Preparation); USES (Uses)
 (Borago officinalis **.DELTA.6-desaturase** cDNA sequence, .gamma.-linolenic acid production by transgenic plant, and improved resistance to chilling)

IT 180583-90-8 180583-91-9
 RL: AGR (Agricultural use); BPR (Biological process); BSU (Biological study, unclassified); BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); PROC (Process); USES (Uses)
 (nucleotide sequence; Borago officinalis **.DELTA.6-desaturase** cDNA sequence, .gamma.-linolenic acid production by transgenic plant, and improved resistance to chilling)

L41 ANSWER 7 OF 9 HCAPLUS COPYRIGHT 2004 ACS on STN
 AN 1996:263712 HCAPLUS
 DN 124:308868
 ED Entered STN: 04 May 1996
 TI Expression of a cyanobacterial **.DELTA.6-desaturase** gene results in .gamma.-linolenic acid production in transgenic plants
 AU Reddy, Avutu S.; **Thomas, Terry L.**
 CS Dep. Biology, Texas A and M Univ., College Station, TX, 77843, USA
 SO Nature Biotechnology (1996), 14(5), 639-42
 CODEN: NABIF9; ISSN: 1087-0156
 PB Nature Publishing Co.
 DT Journal
 LA English
 CC 3-2 (Biochemical Genetics)
 Section cross-reference(s): 11
 AB Gamma-linolenic acid (GLA), a nutritionally important fatty acid in human and animal diets, is not produced in oil seed crops. Many oil seed plants, however, produce significant quantities of linoleic acid, a fatty acid that could be converted to GLA by the enzyme **.DELTA.6-desaturase** if it were present. As a first step to producing GLA in oil seed crops, a cyanobacterial **.DELTA.6-desaturase** gene was cloned. Expression of this gene in transgenic tobacco resulted in GLA accumulation.

Octadecatetraenoic acid, a highly unsatd., industrially important fatty acid, was also found in transgenic tobacco plants expressing the cyanobacterial .DELTA.6-desaturase. This is the first example of engineering the production of novel polyunsatd. fatty acids in transgenic plants.

ST linolenic acid prodn tobacco genetic transformation

IT Synechocystis

Transformation, genetic

(cyanobacterial .DELTA.6-desaturase gene

expression results in .gamma.-linolenic acid production in transgenic tobacco)

IT Gene, microbial

RL: BPR (Biological process); BSU (Biological study, unclassified); BIOL (Biological study); PROC (Process)

(cyanobacterial .DELTA.6-desaturase gene

expression results in .gamma.-linolenic acid production in transgenic tobacco)

IT Molecular cloning

(of cyanobacterial .DELTA.6-desaturase

gene; cyanobacterial .DELTA.6-desaturase

gene expression results in .gamma.-linolenic acid production in transgenic tobacco)

IT Tobacco

(transgenic; cyanobacterial .DELTA.6-

desaturase gene expression results in .gamma.-linolenic acid production in transgenic plants)

IT 506-26-3P, .gamma.-Linolenic acid 81275-46-9P, Octadecatetraenoic acid

RL: BPN (Biosynthetic preparation); BIOL (Biological study); PREP

(Preparation)

(cyanobacterial .DELTA.6-desaturase gene

expression results in .gamma.-linolenic acid production in transgenic tobacco)

IT 9082-66-0, .DELTA.6-Desaturase

RL: BSU (Biological study, unclassified); BIOL (Biological study)

(cyanobacterial .DELTA.6-desaturase gene

expression results in .gamma.-linolenic acid production in transgenic tobacco)

IT 9082-66-0, .DELTA.6-Desaturase

RL: BSU (Biological study, unclassified); BIOL (Biological study)

(cyanobacterial .DELTA.6-desaturase gene

expression results in .gamma.-linolenic acid production in transgenic tobacco)

L41 ANSWER 8 OF 9 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1993:554815 HCAPLUS

DN 119:154815

ED Entered STN: 16 Oct 1993

TI Isolation of a .DELTA.6-desaturase gene from

the cyanobacterium *Synechocystis* sp. strain PCC 6803 by gain-of-function expression in *Anabaena* sp. strain PCC 7120

AU Reddy, Avutu S.; Nuccio, Michael L.; Gross, Lisa M.; Thomas, Terry L.

CS Dep. Biol., Texas A and M Univ., College Station, TX, 77843, USA

SO Plant Molecular Biology (1993), 22(2), 293-300

CODEN: PMBIDB; ISSN: 0167-4412

DT Journal

LA English

CC 7-5 (Enzymes)

Section cross-reference(s): 3, 10

AB The enzyme .DELTA.6-desaturase is responsible for the conversion of

linoleic acid (18:2) to .gamma.-linolenic acid (18:3.gamma.). A cyanobacterial gene encoding .DELTA.6-desaturase was cloned by expression of a Synechocystis genomic cosmid library in Anabaena, a cyanobacterium lacking .DELTA.6-desaturase. Expression of the Synechocystis .DELTA.6-desaturase gene in Anabaena resulted in the accumulation of .gamma.-linolenic acid (GLA) and octadecatetraenoic acid (18:4). The predicted 359 amino acid sequence of the Synechocystis .DELTA.6-desaturase shares limited, but significant, sequence similarity with two other reported desaturases. Anal. of three overlapping cosmids revealed a .DELTA.12-desaturase gene linked to the .DELTA.6-desaturase gene. Expression of Synechocystis .DELTA.6- and .eta.12-desaturases in Synechococcus, a cyanobacterium deficient in both desaturases, resulted in the production of linoleic acid and .gamma.-linolenic acid.

ST desaturase gene Synechocystis cloning sequence

IT Anabaena

(cloning and expression in, of **.DELTA.6-desaturase** gene, of Synechocystis)

IT Gene, microbial

RL: BIOL (Biological study)

(for **.DELTA.6-desaturase**, of Synechocystis, cloning and sequencing of)

IT Deoxyribonucleic acid sequences

Molecular cloning

(of **.DELTA.6-desaturase** gene, of Synechocystis)

IT Protein sequences

(of **.DELTA.6-desaturase**, of Synechocystis)

IT Synechocystis

(**.DELTA.6-desaturase** gene of, cloning and sequence of)

IT 148734-39-8, **.DELTA.6-Desaturase**

(Synechocystis strain PCC 6803 clone pSy75-3.5)

RL: PRP (Properties); BIOL (Biological study)

(amino acid sequence of)

IT **9082-66-0, .DELTA.6-Desaturase**

RL: BIOL (Biological study)

(cloning of gene for, of Synechocystis)

IT **149738-22-7, GenBank L11421**

RL: PRP (Properties); BIOL (Biological study)

(nucleotide sequence of)

IT **9082-66-0, .DELTA.6-Desaturase**

RL: BIOL (Biological study)

(cloning of gene for, of Synechocystis)

IT **149738-22-7, GenBank L11421**

RL: PRP (Properties); BIOL (Biological study)

(nucleotide sequence of)

L41 ANSWER 9 OF 9 HCAPLUS COPYRIGHT 2004 ACS on STN

AN 1993:464918 HCAPLUS

DN 119:64918

ED Entered STN: 21 Aug 1993

TI **.DELTA.-6-desaturase** of

Synechocystis, and cloning and expression of its gene for manufacture of .gamma.-linolenic acid

IN **Thomas, Terry**; Reddy, Avutu S.; Nuccio, Michael; Freyssinet, Georges

PA **Rhone-Poulenc** Agrochimie, Fr.

SO PCT Int. Appl., 46 pp.

CODEN: PIXXD2

DT Patent
 LA English
 IC ICM A01H001-00
 ICS A01H005-00; C12N015-00; C12N009-02; C12P007-64; C12P001-02;
 C12P001-04; C12P021-06; C07H015-12; C07H017-00

CC 3-2 (Biochemical **Genetics**)
 Section cross-reference(s): 16

FAN.CNT 4

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|---|------|----------|-----------------|--------------|
| PI | WO 9306712 | A1 | 19930415 | WO 1992-US8746 | 19921013 <-- |
| | W: AU, BG, BR, CA, CS, HU, JP, KR, PL, RO, RU, US | | | | |
| | RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, SE | | | | |
| | ZA 9207777 | A | 19930421 | ZA 1992-7777 | 19921009 <-- |
| | IL 103407 | A1 | 19990922 | IL 1992-103407 | 19921009 <-- |
| | CN 1072722 | A | 19930602 | CN 1992-113085 | 19921010 <-- |
| | CN 1053469 | B | 20000614 | | |
| | AU 9228812 | A1 | 19930503 | AU 1992-28812 | 19921013 <-- |
| | AU 667848 | B2 | 19960418 | | |
| | BR 9206613 | A | 19950411 | BR 1992-6613 | 19921013 <-- |
| | JP 07503605 | T2 | 19950420 | JP 1992-507243 | 19921013 <-- |
| | EP 666918 | A1 | 19950816 | EP 1992-922205 | 19921013 <-- |
| | R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LI, LU, NL, SE | | | | |
| | HU 69781 | A2 | 19950928 | HU 1994-1007 | 19921013 <-- |
| | HU 217328 | B | 19991228 | | |
| | RO 113256 | B1 | 19980529 | RO 1994-585 | 19921013 <-- |
| | CZ 285471 | B6 | 19990811 | CZ 1994-817 | 19921013 <-- |
| | RU 2152996 | C2 | 20000720 | RU 1994-30816 | 19921013 <-- |
| | JP 3537434 | B2 | 20040614 | JP 1993-507243 | 19921013 <-- |
| | CN 1174236 | A | 19980225 | CN 1997-104566 | 19970321 <-- |
| | CN 1121499 | B | 20030917 | | |
| PRAI | US 1991-774475 | A | 19911010 | <-- | |
| | US 1992-817919 | A2 | 19920108 | <-- | |
| | WO 1992-US8746 | A | 19921013 | <-- | |
| AB | The gene for .DELTA.-6-desaturase (I) of Synechocystis is cloned, sequenced, and expressed for manufacture of .gamma.-linolenic acid (II). The I gene was cloned from a partially Sau3A-restricted genomic library of Synechocystis (PCC 6803) by the gain-of-function method using a filamentous cyanobacterium Anabaena deficient in II but rich in linoleic acid. Also cloned was .DELTA.-12-desaturase (III) gene using an oligonucleotide probe derived from known III gene sequence. Expression of the I and III genes in Synechococcus (PCC 7942) deficient in linoleic and II was shown. The recombinant Synechococcus produced II from oleic acid. Also shown was the expression of I gene in tobacco plant. | | | | |
| ST | desaturase gene Synechocystis cloning linolenate manuf | | | | |
| IT | Plant | | | | |
| | (chill-resistant, cloning of .DELTA.-6-desaturase gene of Synechocystis in relation to preparation of) | | | | |
| IT | Gene, microbial | | | | |
| | RL: BIOL (Biological study) | | | | |
| | (for .DELTA.-6-desaturase of Synechocystis, cloning and expression of, .gamma.-linolenic acid manufacture in relation to) | | | | |
| IT | Deoxyribonucleic acid sequences | | | | |
| | (of .DELTA.-6-desaturase and .DELTA.-12-desaturase of Synechocystis) | | | | |
| IT | Protein sequences | | | | |
| | (of .DELTA.-6-desaturase of Synechocystis) | | | | |
| IT | Plasmid and Episome | | | | |

- (pAM854-.DELTA.-12 and pAM854-.DELTA.-6 and -.DELTA.-12, .DELTA.-12-
desaturase and **.DELTA.-6-desaturase**
 genes on, expression in Synechococcus of)
- IT Corn
 Peanut
 Rape (plant)
 Soybean
 Sunflower
 Tobacco
 (transgenic, .gamma.-linolenic acid-producing, cloning of
.DELTA.-6-desaturase gene of Synechocystis
 in preparation of)
- IT Fermentation
 (.gamma.-linolenic acid, with recombinant microbes, **.DELTA.-6-desaturase** gene of Synechocystis cloning and
 expression in relation to)
- IT 148734-39-8, **.DELTA.-6-Desaturase**
 (Synechocystis clone csy75-3.5)
 RL: BIOL (Biological study)
 (amino acid sequence of and cloning in Anabaena of gene for)
- IT **9082-66-0, .DELTA.-6-Desaturase**
 72536-70-0, .DELTA.-12-Desaturase
 RL: BIOL (Biological study)
 (gene for, of Synechocystis, cloning and expression of,
 .gamma.-linolenic acid manufacture in relation to)
- IT 506-26-3P, .gamma.-linolenic acid
 RL: PREP (Preparation)
 (manufacture of, cloning and expression of **.DELTA.-6-desaturase** gene of Synechocystis in relation to)
- IT 25448-06-0P, Octadecatetraenoic acid
 RL: BMF (Bioindustrial manufacture); BIOL (Biological study); PREP
 (Preparation)
 (manufacture of, with organism deficient in .gamma.-linolenic acid, cloning
 of **.DELTA.-6-desaturase** gene of bacterial
 Synechocystis in relation to)
- IT **148734-40-1 148734-41-2 148734-42-3**
 RL: BIOL (Biological study)
 (nucleotide sequence and cloning in Anabaena of)
- IT **9082-66-0, .DELTA.-6-Desaturase**
 RL: BIOL (Biological study)
 (gene for, of Synechocystis, cloning and expression of,
 .gamma.-linolenic acid manufacture in relation to)
- IT **148734-40-1 148734-41-2 148734-42-3**
 RL: BIOL (Biological study)
 (nucleotide sequence and cloning in Anabaena of)

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